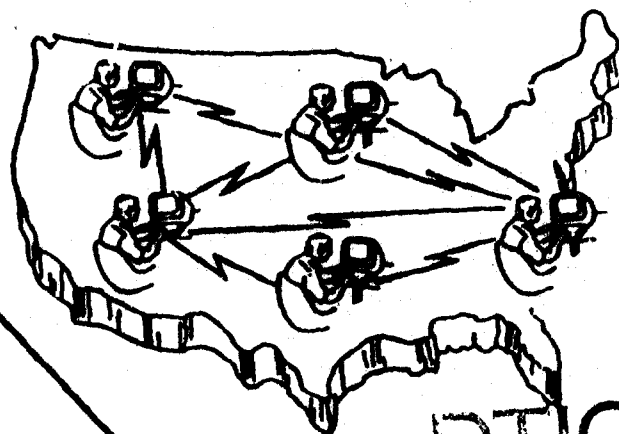


LEXSYS

Living Expert System



ARMY SENIOR
LEADER DECISION
MAKING TOOL FOR
THE 90s



U.S. ARMY WAR COLLEGE
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discussions by key military and civilian participants. A strong case was made for implementation of an Army Living Expert System.

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USAWC MILITARY STUDIES PROGRAM PAPER

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THE LIVING EXPERT SYSTEM

A GROUP STUDY PROJECT

by

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THE LIVING EXPERT SYSTEM

PREFACE

This concept for the Living Expert System has been written at the request of the Vice Chief of Staff of the Army. But more importantly, the concept is an extension of the vision of a group of voluntary contributors who pooled their efforts to lay the groundwork for this important decision support system.

The members of this study group, students at the Army War College and many experts in computer teleconferencing and decision making processes, used the U.S. Army Forum Network and its computer-based teleconferencing capability to fully analyze the potential for enhancing the Army's decision-making capability for senior executives.

Many others have contributed to the text of this concept. Sources are cited in the Bibliography.

In this study, he, him, or his represent both the masculine and feminine genders, unless otherwise stated.

We want to especially acknowledge the support and assistance of Chaplain (Colonel) Timothy Tatum, Faculty Advisor; Lieutenant Colonel Edmund Feige, FORUM Net Organizer; and Colonel (ret) Mike Malone, a super soldier and thinker. Many others contributed significantly as well, and we are deeply indebted to each of them for their insight and expertise.

DISCLAIMER

The ideas and opinions expressed in this paper are the authors' own, they are not to be considered as official policy of the Department of the Army.

INTRODUCTION

This report is the result of a Military Studies Program Project conducted by ten students in the U.S. Army War College Class of 88. The study group analyzed the concept of the Living Expert System (LEXSYS) which was initially developed by members of Excelnet, a leadership study subnet on the U.S. Army's FORUM computer based teleconferencing system. (Appendix A.) The Living Expert System Concept study was commissioned by General Arthur Brown, the Army Vice Chief of Staff. In a message to senior leaders in the Army, he said:

On 17 July 1987, I was briefed on the Living Expert System, an innovative off line decisionmaking concept linking subject matter experts on a computer data link. Designed to pool centers of expertise, and assist decisionmakers in rapidly gathering opinions and information, LEXSYS has a great potential as a decision support mechanism for the Army. Its outreach capability will help recover more of the Army's investment in training and education. I see this as a potentially valuable tool in the Army decisionmakers's inventory. I consider this an appropriate topic for a research project at Carlisle. The added research by students in this year's AWC class might well provide what is needed to bring this concept to its full potential.

LEXSYS is a decision support mechanism used to analyze issues and develop alternatives for decisionmaking. LEXSYS uses computer teleconferencing to conduct meetings, and data storage banks to record credentials of issue experts and the results of issues studied. Computer teleconferencing allows asynchronous discussion of issues by experts in their field

without having to bring these experts together at the same time for conferencing. Computer teleconferencing also allows individuals to participate at their convenience, whether at work or at home, and whenever their schedule permits. The LEXSYS talent bank provides a broad base of experts. This data base expands the expertise available to decisionmakers beyond their current organization or resources. LEXSYS does not replace traditional command and staff procedures, but it complements them by providing in-depth expertise on selected issues.

With constrained resources, the Army faces an increasing need for in-depth study of issues and problems in order to accomplish more with less. The advantages of LEXSYS are as follows:

- LEXSYS will provide senior leaders with a means to tap existing Army expertise from geographically dispersed locations to support decision-making requirements.
- LEXSYS will save TDY money and travel time by using teleconferencing rather than face-to-face meetings. Reduced travel will give experts more time to work on issues and problems.
- In many instances, LEXSYS will allow individuals with unique knowledge and expertise to continue to serve Army needs in these areas even though they may be assigned out of the field.

- LEXSYS will maintain a historical record that can be searched quickly and easily by future problem solvers seeking to avoid duplicative studies.

- LEXSYS will promote inter-organizational collaboration, information sharing, and jointness in issue study and problem solving.

Thus, LEXSYS will bring the enormous information processing capacity of the computer to bear on issue studying and problem solving without expending additional resources.

PART I.
EXECUTIVE SUMMARY

THE LIVING EXPERT SYSTEM

PART I

EXECUTIVE SUMMARY

A. General.

This summary describes the Living Expert System (LEXSYS). It cites potential uses of LEXSYS and addresses the advantages and limitations of the system. LEXSYS is a decision support mechanism designed to augment an organization's current issue study and problem recognition and resolution capabilities. LEXSYS utilizes the advantages of computer teleconferencing to maximize resources by providing a broad base of expertise to study important issues. The hardware and software necessary to implement and operate LEXSYS is already available to Army organizations and individual experts. Implementation of LEXSYS requires identification of a system proponent, establishment of a computer teleconferencing net, and creation of an expert talent data bank. LEXSYS will begin with a small computer teleconferencing system and data base made available to a limited number of senior decision makers. As users gain confidence in the system and the data base expands, it should be made available to a larger body of decision makers throughout the Army. Thus the talent data bank should continue to grow and be updated as more issues and problems are studied and as experts are identified, catalogued, and added or deleted from the data base.

The Living Expert System is composed of several elements:

- A proponent to act as systems management and control.
- A data base that identifies, categorizes, and classifies subject matter experts.
- A computer teleconferencing net to provide study group participants with effective and economical communications.
- Procedures and methodologies to conduct issue study and problem resolution teleconferencing.
- An automated recorder providing a written record of discussions and alternatives developed by each issue study group.

Potential uses of LEXSYS that can be used individually, sequentially, or simultaneously to address problems are:

- As a sounding board for the initial formulation of a concept.
- As a study group addressing a problem or issue in detail, to produce findings and recommendations.
- As the respondent group for quick turnaround information on specific items.

Using LEXSYS to organize study groups and to capitalize on computer teleconferencing capabilities to conduct an issue study or problem resolution provides several advantages. First, it greatly increases the means of bringing experts together on a given issue. Second, it is economical. LEXSYS provides the best experts for a study group and at the same

time negates most of the reasons why personnel are not available to participate. Asynchronous computer teleconferencing allows participants the flexibility to fit the study group efforts into their schedules, eliminating schedule adjustment that is often required with face-to-face conferences. LEXSYS will make it easier for experts to share their knowledge and thus will encourage and facilitate this kind of sharing. Also, LEXSYS will have quicker and easier access to expert knowledge and insights. Reducing the need to bring study groups together at a central location will result in savings of temporary duty funds and in time lost due to travel.

Over time, LEXSYS will develop a data bank of information on a large range of issues. This historical record can be searched quickly and easily by future problem solvers as they try to understand current impacts of processes begun several years earlier or seek to avoid going over the ground covered by others. Participation in LEXSYS will provide an informal, but important, cross-fertilization and sharing of ideas among the participating experts. So the system will enhance professional development of experts as well.

Although LEXSYS is an effective tool for issue study and problem resolution, it has some limitations. It depends on voluntary participation; it will begin with a limited talent bank; it may be perceived as impersonal; and some experts may lack sufficient computer skills to contribute to the program. All of these problems can be readily overcome once LEXSYS is

implemented and in use. Further, LEXSYS's current inability to handle classified information prevents its use to study and resolve classified issues. However, recent software and hardware developments have been approved to handle classified information up to and including SECRET material. These developments are currently under consideration for handling TOP SECRET information. When approved for use with LEXSYS, these developments will further enhance LEXSYS capabilities.

The Living Expert System combines the enormous information processing capacity of the computer, the decentralized meeting capability of computer teleconferencing, and the convenience of asynchronous communications to accomplish important studies that otherwise may not be accomplished due to an organization's limited resources or its inability to locate subject matter experts.

B. Conclusions and Recommendations.

1. Conclusions

After careful study, testing, and analysis of LEXSYS, the AWC study group has concluded that the concept is capable of fulfilling the expectations earlier envisioned. LEXSYS is a viable decision support system which can provide senior leaders of the Army with a multi-disciplinary, multi-dimensional, and interactive knowledge base for dealing with their most pressing concerns.

A full and mature LEXSYS cannot be realized and implemented overnight. The work accomplished to this point has resulted

in a small but very important talent bank of experts from many fields. These people are typical of those who will form LEXSYS work groups desired by senior executives in the future. Over a period of time, their number must increase as LEXSYS becomes more credible and is used by senior executives.

Through its distinctive asynchronous computer teleconferencing capabilities, LEXSYS has considerable potential to save resources. Cost benefits associated with taking advantage of the Army's knowledge capital are difficult to quantify; however, savings in manhours and TDY expenditures are readily quantifiable and are exceedingly more important as we live in a resource constrained environment.

LEXSYS should increase productivity. Asynchronous computer teleconferencing reduces the stress and inconvenience associated with TDY/travel, thus providing more time for enhancing the quality of work already done and improving the input to decision makers. There is also the possibility of increased productivity resulting from the synergistic effect realized from the ongoing exchange of information and ideas by geographically dispersed experts who are linked electronically.

Further analysis must be undertaken to determine the factors which motivate participation. The question of voluntary participation as the key to LEXSYS remains unanswered. LEXSYS may require mandatory participation by some position experts to fully realize its potential.

2. Recommendations

a. Adopt LEXSYS as a functional problem solving and decision support system for use by senior Army leaders. The LEXSYS concept has proven to be a workable tool for assisting senior executives with an issue, problem, or decision opportunity. In practical terms, LEXSYS is suitable for dealing with quick turnaround requirements; for the more time consuming, indepth analysis of large problem areas; or for major opportunities requiring resolution of many smaller issues, problems, and decisions.

b. Establish proponency for LEXSYS on the Army Staff. The most effective management of LEXSYS in support of the Army's senior executives will be realized by establishing proponency on the Army staff. It is the nature of the Army Staff to be responsive to the issue and problem solving needs of the Army's senior leadership; LEXSYS, functioning as an issue and problem solving tool, will enhance such responsiveness.

c. Enlarge the talent bank of experts. Enlarging the talent bank of experts is a normal and desired progression envisioned for LEXSYS. Information filtered through an ever increasing talent pool will provide for fresh knowledge, flavored with the human element, and able to deal with the decision environment characterized by large numbers of variables, risk, and uncertainty.

PART II.
LIVING EXPERT CONCEPT

THE LIVING EXPERT SYSTEM

PART II

LIVING EXPERT CONCEPT

A. Historical Overview. Senior military leaders have historically used advances in technology to speed and enhance the command-staff process. This has been particularly true since the development of the telephone, typewriter, radio, and, now, computer teleconferencing. Computer teleconferencing is not only timely, but also links military and civilian experts together with an ease and reduced cost not previously available. LEXSYS began when COL Dandridge M. (Mike) Malone entered an item on 25 September 1986 on the U.S. Army FORUM net, articulating his vision for the future.

The easiest way to understand LEXSYS is to go out five years and see the terminal as ubiquitous as the telephone, . . . Now, suppose that . . . we have been doing an analysis of each War College student's expertise . . . things that they're good at, areas such as OPFOR, NTC, etc. Five years X 200 students X 10 areas per student is 10,000 "smarts," each representing a piece of Army "knowledge capital." Now database organize all that expertise. Now, be a 3-4 star for a moment, working a puzzle, dream or vision and coming up with a set of information needs . . . Turn on your PC, punch in the profile of needs you got working in your head, let the database run and fall out the names. By tomorrow, that cluster becomes a temporary, asynchronous, geographically and organizationally dispersed "adjunctive staff," not to do your work for you, but to help you create a solution to a puzzle, a dream, a vision.

Recognition of the need for a LEXSYS system had been germinating in the minds of many people for several years.

MAJ Alex Wojcicki began a new item, September 1986, in the U.S. Army FORUM net to discuss the concept. As more participants voluntarily joined, a subnet of FORUM called Army:Living Expert System (ARMY:LES) was formed. These participants refined and matured the LEXSYS concept through the use of computer teleconferencing technology. Although geographically and organizationally dispersed, they jointly prepared a 75 page operational concept paper. This operational concept of LEXSYS was briefed to the Vice Chief of Staff of the Army. He directed that LEXSYS be studied in further detail and that recommendations for its implementation be formulated.

The directive of the Vice was carried out by the U.S. Army War College through the formation of a study group composed of the Class of 88. This study group, working on the task as a Military Study Project (MSP), conducted an analysis of LEXSYS during the 1988 academic year. The analysis began where the original coordination draft, 3 July 1987, finished. Following analysis, this Military Study Project resulted in recommendations for the LEXSYS organizational structure, training requirements, database organization, operational concept, and promotion. The USAWC study included a methodology to identify experts and update the expert database through a survey which was administered to the faculty and Class of 88. The results of the survey led to the formation of a small talent data bank. On a voluntary basis, these experts conducted a LEXSYS prototype to solve a senior executive level issue and to validate the LEXSYS model.

Results of this study and analysis led to the completed LEXSYS Military Study Project which was briefed to the Army's senior executives in the spring of 1988.

B. LEXSYS Process. The sequence of activities necessary to utilize LEXSYS in studying an issue or solving a problem is as follows:

1. The study issue or problem is identified by a senior leader or command. This leader or command is identified as the proponent of the issue study group effort.

2. The proponent provides a person to be the LEXSYS Issue Facilitator. The facilitator prepares a statement of the issue or problem and provides any assumptions, facts, or guidance from the proponent to the study group.

3. The LEXSYS Manager and the Issue Facilitator make a talent bank search for personnel with the necessary expertise in the field of the issue or problem. The Issue Facilitator makes other personnel contacts if required to seek more expertise for the study.

4. All expert nominations are submitted to the proponent for selection of members who will make up the study group. The size of the study group is determined through the selection process.

5. The selected personnel are contacted by the Issue Facilitator seeking their agreement to participate in the study group effort. Final approval of the study group is given by the proponent.

6. An issue subnet is established on LEXSYS by the LEXSYS Manager, and tutorial training is given to study group participants who need it on the use of computer teleconferencing in study group efforts.

7. The issue agenda is published by the Issue Facilitator and agreed upon by the study group.

8. The study group participates in issue discussions and alternatives formulation, using computer teleconferencing in lieu of face-to-face centralized meetings.

9. The study group completes analysis/comparison/testing of possible alternatives/solutions/recommendations as appropriate. Then they are presented by the Issue Facilitator to the proponent for acceptance.

10. The proponent accepts the results of the study group or provides additional guidance and the discussion/analysis/selection process is repeated by the study group until results are acceptable to the proponent.

11. When the proponent is satisfied with the work group efforts, feedback is provided by the proponent and appropriate recognition is given for the participants' voluntary efforts--letter of appreciation, personal thank you note, etc.

12. Upon study group completion, the LEXSYS Manager terminates the issue subnet on LEXSYS, updates the participating experts' credentials in the LEXSYS talent bank, and stores a record of issue discussions in the LEXSYS data bank for future reference.

C. Concept of Operation.

1. Management of the LEXSYS program will reside in the Office of the Vice Chief of Staff of the Army in the Decision Systems Management Agency (DSMA). In all likelihood, Executive Action Directorate (EAD) will eventually assume responsibility for the program. The study group believes that resolution of issues can best be served by focusing LEXSYS at the highest level of the Army.

2. The LEXSYS network should be a separate organization unconnected with any existing computer network. The following diagram (Figure 1) represents the LEXSYS organization.

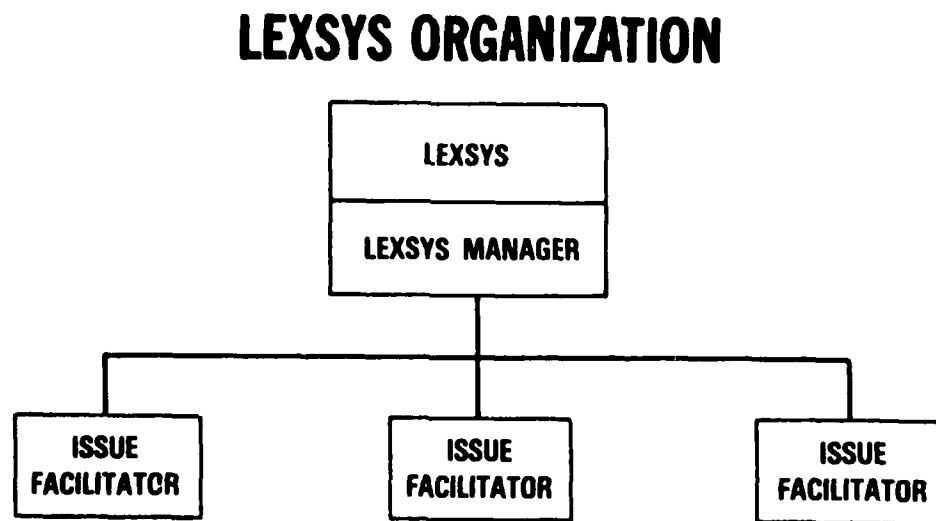


FIGURE 1

3. The LEXSYS Manager (LM) is a multi-functional person. Initially the LM will establish a data base of knowledgeable personnel in specialized fields. The Manager will be responsible for keeping the data base updated. The data base will initially consist of Senior Service School students, faculty, and other interested individuals. The other interested individuals will be identified by personal knowledge of experts ("the old boy system"), participants from the existing FORUM net, staff currently serving in positions related to specific issues, and personnel management data maintained by the Total Army Personnel Agency (TAPA). Senior Service School students will be asked to volunteer and participate in issue resolution through the use of the LEXSYS subnets. To begin building the data base, incoming Senior Service School students must be surveyed to identify subject area experts within each class. Once expertise is determined, participation by the students will be voluntary. The talent pool is dynamic. New people and skills will be added and dropped from the system as appropriate. The diversity of skills, the accessibility of expertise to the senior executive, and the ability of the geographically dispersed experts to communicate efficiently and asynchronously make the LEXSYS a powerful tool. The data base will be updated periodically in conjunction with TAPA to help maintain credentials of existing experts and to acquire new experts.

When a request is made to place an issue on the LEXSYS system, the manager will authorize the establishment of a

subnet, search the talent data base for possible participants, and issue the identification numbers (ID) for those seeking to participate in the net. The LM has the additional responsibility of maintaining the data base. The ID's will be strictly controlled by the LEXSYS Manager. The manager will catalogue issues and maintain a historical record of discussions as well as a real time record. The LM will serve as the training coordinator for the Issue Facilitator. A training package will be provided to the Issue Facilitator, which will include appropriate training software and written documentation. When an issue is resolved, the LEXSYS Manager will close the net and file the data electronically as a historical record.

4. The senior leader's representative who submits an issue to the LEXSYS Manager will be known as the Issue Facilitator (IF). The Issue Facilitator is the key operator in the LEXSYS program. This individual must function as a leader, manager, administrator, facilitator of discussion, and integrator of concepts and ideas. The IF functions as the "chief of staff" and provides the results to the senior leader who has requested or directed the work effort. Using all of the techniques of indirect leadership and most of the techniques of direct leadership, the IF will guide the LEXSYS group toward completion of specific projects. The IF is the sponsor of the issue to be addressed and resolved. After obtaining permission to establish and operate a subnet, the IF will obtain a list of prospective Subject Matter Experts (SME). The facilitator has

several functions. In coordination with the LEXSYS Manager, the IF will select the number of experts to work on a particular issue. After the selection process is completed, the IF will contact individuals to solicit their participation. The IF will then help teach all members of the conference basic computer conferencing commands as needed. He will offer either broad instruction about how the system works or answering specific questions concerning computer conferencing. The IF will have the responsibility for updating the subnet index so participants can find items of interest to them easily and quickly. The facilitator will work with new participants so they can use computer soft/hardware and employ CONFER, software written by Dr. Bob Parnes. The IF will monitor conference participation. His check of conference activity will occasionally show that some individuals have not signed on to the system for some time. The Issue Facilitator should send messages to individuals who frequently sign on just to "read only's" and encourage them to talk. Phone calls to the infrequent participators will help to encourage participation or assist with a problem conference members may be having accessing CONFER. Additionally, the facilitator will keep the disk record of the conference updated. This is a time-consuming duty, but it pays off in having backup data of net discussions.

The IF is responsible for the collection of information from the net. He draws conclusions and makes recommendations to the issue proponent. When the issue study is complete, the

IF will provide feedback to all participants regarding the disposition of the study.

5. Net participants have several responsibilities. As volunteers, they must ensure they inform their superiors of participation in the program. The participant must be willing to spend some time in learning how computer conferencing works. They will be asked to provide honest, candid expertise concerning issues. Additionally, they will be asked to provide the LEXSYS Manager with credentials in their area of interest and expertise and to keep the manager informed of their level of interest. The first line of participants will be volunteers, though it is possible that certain issues will require mandatory participation. It is conceivable that experts could be temporarily assigned to full time work on a complex LEXSYS project.

D. Data Base Development

LEXSYS is as good as its data base. Identification of expert participants, cataloguing of available skills and expertise, maintaining an up-to-date issues file, providing for appropriate interface with other systems, and keeping the data base current requires a comprehensive and ongoing effort. The continuous development and maintenance of the data base is the prime responsibility of the LEXSYS Manager. Critical elements of responsibility for the LEXSYS Manager include:

1. Identification of Participants. Information needed to properly identify expert participants include: the acquired expertise, area(s) of interest for contribution on LEXSYS, address, and phone number. It would also be advantageous to have new participants indicate their previous participation on other computer teleconferencing nets. Such information could assist the LEXSYS Manager not only in evaluating the level of expertise acquired but also in determining the level of teleconferencing skills possessed by the participant.

Participation on LEXSYS should not be limited to any particular group. It should be open to officers, NCO's, and civilians (to include retired military personnel). NCO participation allows for another dimension of expertise that cannot be ignored by LEXSYS users. Civilians, both those within and outside of the government, certainly should participate. It is important to be careful of conflict of interest when including civilians outside of government. LEXSYS must not be simply a "good old boy" net made up solely of friends and "think-alikes." The dynamic nature of LEXSYS allows it to accommodate expert opinion from all sources, whatever direction the opinions may take.

The Army War College (AWC) LEXSYS study group developed a survey instrument for gathering and evaluating information on the areas and levels of expertise possessed by the 1987-88 AWC class. A copy of the survey instrument is at Appendix A. The survey results provide a sufficient number of experts for

participation in the LEXSYS prototype. In the future, additional participants will be provided from a variety of sources: those identified by senior executives, personnel from Army schools, people involved in graduate education programs, FORUM participants, those serving in specific job positions requiring certain levels of acceptable expertise (S, G, J staffs), personnel identified through the Total Army Personnel Agency (TAPA) and Headquarters Department of the Army Decision Support System (HQDADSS), and others the LEXSYS Manager may identify in order to provide for an ever increasing data base.

2. Selection of Experts. Basically, two types of experts are available to LEXSYS. The first are the experts who possess facts, data, and thorough knowledge and understanding of the subject at hand. These experts have mastered the facts and consider their input always to be right. The second are the experts who possess a deep belief system about the subject at hand, can marshal an impressive amount of biased information to make their point, and will usually adhere to their cherished beliefs in the face of contrary evidence. What is most needed in LEXSYS is a third type of expert who falls somewhere between the first and second types. These experts are those who know that in a fast-moving society with ever changing values and technology, expert information may become stale, out of date, and out of step with what is really happening. In the face of contrary evidence, these experts are willing to take another

look at the facts, consider again the adequacy of cherished beliefs, and arrive at new conclusions.

The selection of experts for participating in LEXSYS is based upon a number of factors. As already indicated, the individuals selected must possess an acquired relevant level of expertise, and they must be able to communicate it to others. This requirement is foremost.

Normally, participation in LEXSYS should be voluntary, but there may be occasions when mandatory participation becomes the case. Mandatory participation may be justified on the basis of professional responsibility and duty assignment since the expertise possessed will more than likely have been gained through Army involvement and can be considered Army "knowledge capital." Later, LEXSYS developers may wish to consider the prospect of mandatory registration of identified experts who would participate on a voluntary basis. This would also give the option of a "draft" if desired.

Another factor in the selection of experts is the required approval from the LEXSYS Manager for participation. The requirement for approval effectively controls access to the LEXSYS Net. For those who anticipate working on the LEXSYS net during normal duty hours, command approval may also be necessary. If participants do not master the basic LEXSYS program with reasonable guidance and within a reasonable time period, they should not be approved for further access to the system.

3. Categorizing Areas of Expertise. The LEXSYS Manager must maintain an appropriate categorized subject matter file that matches the areas of expertise with those individuals possessing the requisite knowledge. Once the subject matter file is identified, then the IF selects specific individuals to work the issue at hand.

4. Cataloguing Issues. Gathering of information is a matter of high priority. But providing access to information already gathered is the better part of wisdom. Information gathered on issues already worked through by LEXSYS participants should be catalogued and made available to senior executives and others as appropriate.

5. Data Base Interface. LEXSYS should be compatible with other operational systems and therefore enhance information gathering needed for identifying experts and working various issues. For example, LEXSYS should interface with systems used by TAPA and HQDADSS. Though current TAPA Data Bases are not totally adequate to identify experts, they could be helpful in providing some of the demographics necessary for a more complete identification of participants. HQDADSS, using a natural language processing technique called "Intellect," affords those without familiarity with high technical database query language to access Army corporate data using common English language.

Due to the limited time available for the early development of LEXSYS, the AWC LEXSYS study group decided not to invest the energy needed for solving other than the simplest problems of data base interface. Also, establishing an interface with either TAPA or HQDADSS would not add to this study effort. However, future developers should make every effort to effect data base linkage with other systems, apart from which LEXSYS will not reach full maturity.

E. Maintaining the Data Base. The information on experts in the data base maintained by the LEXSYS Manager is separate and apart from the participating expert's Officer Record Brief (ORB) and other official personnel files. The information in the LEXSYS data base is available to the Army's senior executives who wish to utilize LEXSYS to work issues they deem appropriate.

The data base of experts is dynamic; new people and new skills should be added and others should be dropped. To maintain the data base of experts, the LEXSYS Manager should conduct an annual inquiry to all experts asking for an update on their area(s) of expertise.

At a given time, an individual should no longer remain in the data base. This will probably be indicated by a lack of participation on the net or degraded expertise.

F. Hardware/Software Considerations.

1. Implementation of LEXSYS requires the establishment of an expert data base, a computer telecommunications software

system, a host or mainframe computer, a modem, and a computer or communications terminal for participants. Our discussion of the various components of the system is based on the following assumptions:

a. That CONFER II software resident on a large mainframe computer will support LEXSYS computer teleconferencing. CONFER II is a teleconferencing system with software that operates on the Michigan Terminal Service (MTS), the Wayne State University Computer Services Center at Detroit, Michigan, and other sites. CONFER is currently used by the Army to support the US Army FORUM, a field operating agency (FOA) of the Office of the Chief of Staff, Army, supporting over 1500 users in a variety of disciplines.

b. That a mainframe computer, linked to the necessary telephone node, is available within the Army or under a commercial lease agreement with the government.

c. That the means to communicate between the mainframe and the computer terminals will be government or civilian telephone circuits, or communications networks with modem interface.

d. That LEXSYS experts will use government owned or privately acquired computers or communications terminals to communicate with the mainframe and other users in issue resolution.

2. Hardware Configuration.

a. LEXSYS is designed to operate with existing hardware currently available to the Army. Many of the equipment resources

currently used in the operation of the Army FORUM net can be utilized for LEXSYS subnet operations. Three hardware items are necessary to establish LEXSYS: a host computer, a communications interface, and a series of computer terminals. Figure 2 depicts the hardware configuration.

LEXSYS HARDWARE CONFIGURATION

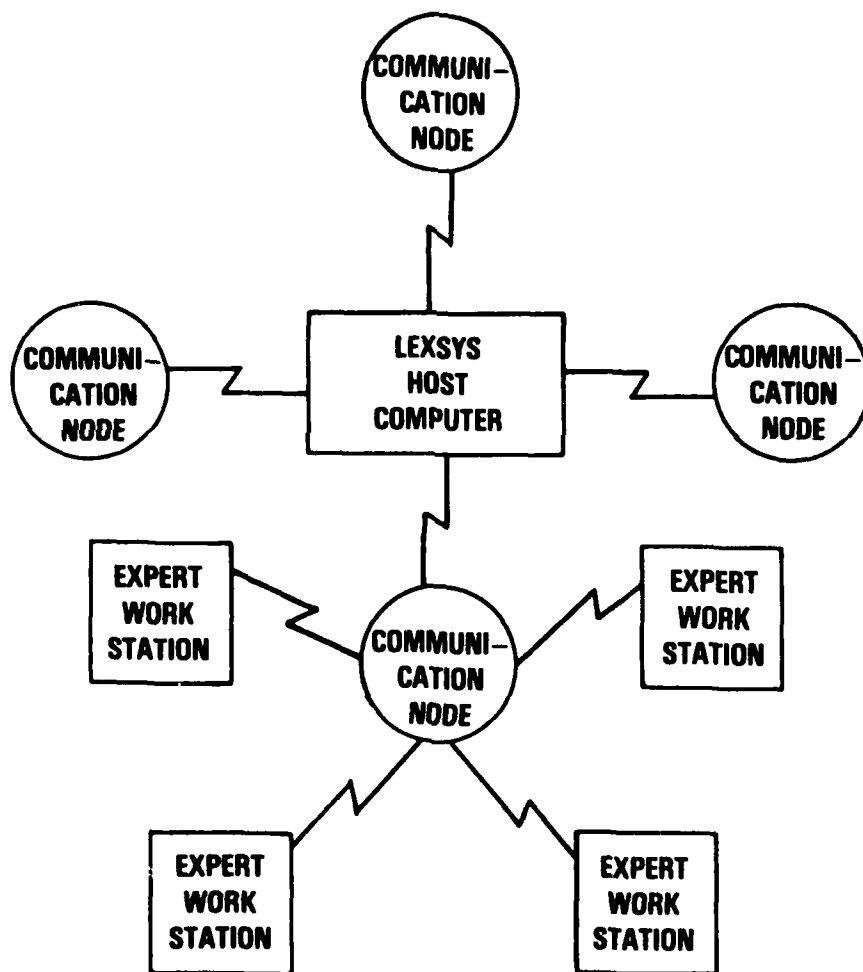


FIGURE 2

b. Host computer requirements can be met by using any existing Army owned mainframe or commercially leased system. The host computer will store the talent pool or data base and run the software necessary to support the various subnets. The selection of the host computer must be determined by the Decision Systems Management Agency, Management Directorate of the Army Staff, based upon computer usage rates on Army systems and contract arrangements for leased computer support. In coordination with the Chief, FORUM Office, it was determined that the Wayne State University mainframe is suitable as a host for LEXSYS. This mainframe hosts the FORUM nets and could operate LEXSYS as a parallel but independent system.

c. The communications interface between the host computer and the computer terminals is achieved through a modem and the existing telephone network within the Army. The specific configuration is site dependent based upon the installation's internal commercial and government phone line network, e.g., AUTOVON, TELNET, etc. LEXSYS participants using a privately owned computer will need a 300, 1200, or 2400 Baud modem connected to the individual's home telephone service. The use of home telephone service will not incur additional costs for line use since commercially leased lines are accessible through local exchanges in most areas in CONUS. Personal costs would not be chargeable to the government unless participation is directed and government equipment is

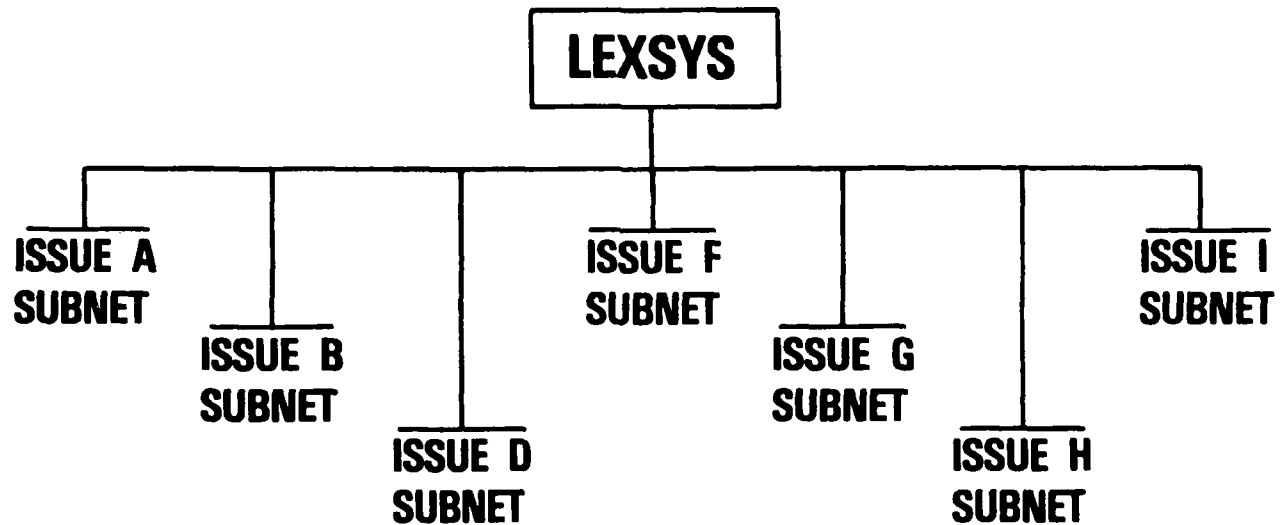
not available. The LEXSYS proponent is the agency responsible for determining reimbursement considerations.

d. Army personnel identified as experts will have access to small computers at their assigned installations. The local Director of Information Management (DOIM) should acquire the necessary communications terminal and modem when they are not readily available to a LEXSYS participant.

3. LEXSYS Networking

a. LEXSYS is capable of managing multiple subnets over a geographically dispersed area with varying numbers of participants. Figure 3 depicts a snapshot picture of LEXSYS operations. A description of the activity follows:

LEXSYS NETWORKING



SUMMARY OF LEXSYS SUBNET OPERATIONS

SUBNET	PARTICIPANTS	OPERATIONAL PERIOD
A	27	8 WEEKS, ON GOING
B	30	6 WEEKS, ON GOING
C	38	1 WEEK, COMPLETED
D	20	5 WEEKS, ON GOING
E	ALL ACTIVE	24 HOURS, COMPLETED
F	27	5 WEEKS, ON GOING
G	29	4 WEEKS, ON GOING
H	22	2 WEEKS, ON GOING
I	35	1 WEEK, ON GOING

FIGURE 3

In Figure 3, seven subnets handling 7 different issues are open. These subnets are depicted as A, B, D, F, G, H, and I. The number of experts participating and the length of operations is listed. Subnet "C" was operational for one week and involved 38 participants. Upon resolution of the issue, the subnet was closed. Subnet "E" was operational for 24 hours and open to all active participants of subnets A, B, and D. This issue required a quick turn-around or immediate response. The immediate response requirement precluded initiating the start up process of LEXSYS, thereby precluding subject matter experts' involvement in issue resolution. Refer to Part IIa for a description of the LEXSYS process.

b. LEXSYS is not designed to function as a continuous operating net with all experts tied indefinitely for immediate response to an issue. Figure 3 shows only a portion of the experts in the data base participating. Experts are called upon to interact on the net on issues relative to their area of expertise. The frequency of subnet interaction should be established by the issue facilitator. Continuous operation of the net involving all experts to query the net daily is not cost effective and may act as a deterrent to continued participation in LEXSYS.

4. Software Requirements

a. LEXSYS software requirements consist of three basic parts: an Expert Data Base, a computer terminal capable of handling teleconferencing, and a telecommunications application

software. All three requirements can be supported by using software applications currently available to the Army FORUM Network. Although LEXSYS will operate under the same parameters as FORUM, its total independence allows a more disciplined control of net users involved in working or resolving issues.

b. Expert Data Base - The expert data base consists of three (3) files which record the talent base, list previously worked issues, and cross reference the data bases. The primary file is the expert listing by name, area of expertise, location, etc. The issue file is a historical record of previous issues submitted for resolution and pertinent information regarding the issue and the subnet operation. The cross reference file captures key phrases about issues, experts, and collateral areas. The files provide a means of determining what previous work has been completed on an issue or which experts have experience working similar problems. Proper maintenance of the file will preclude "reinventing the wheel," since the LEXSYS Manager would screen the file to match new issues against previous work.

c. Operating System

(1) The LEXSYS operating system (CONFER II) is resident on the host mainframe. CONFER II allows the asynchronous interaction of experts via the computer over a span of time. Similar to a conference in which all participants are physically present, CONFER II ensures that every subnet user is advised of the discussion points, allows all users to review the comments

(input) of other users, and permits comments to be entered on discussion points. CONFER II has a built-in tool capable of accessing the degree of agreement or disagreement that the participants have with reference to a variety of solutions.

(2) CONFER II can manage multiple subnets functioning independently of each other. In effect, multiple conferences are ongoing simultaneously. Experts working on one IEXSYS subnet participate only on the issue in which they have expertise. Experts are not generally advised about other subnets or the issues under discussion, but they may be asked to comment on other subnets should the discussion call for their area of expertise.

(3) CONFER II is a complex software package with numerous lines of code required to handle the various functions. While the users are oblivious to the inner workings of CONFER II code, occasionally an interrupt in user interaction may occur. The interrupt may be caused by any one of several external factors. The main cause of some of the difficulty is associated with the quality of the communications line (phone line). Such interrupts can not be controlled; they do frustrate new users of CONFER II. Proper training and coaching of new users will reduce the frustration level.

d. Software operates within the communications terminal and speaks the protocol language of the mainframe using the telephone lines. Numerous software packages can make this link. Basically these systems are alike, but they differ in the number of special features and user friendliness. To

preclude any difficulties in the initial training of new experts on LEXSYS, the telecommunications software should be standardized for new users. As experts achieve greater computer literacy, they may choose their own telecommunications software. Several software packages are extremely easy to use and are available for government use and may be reproduced without fee.

5. Use of Personal Computers and Software

a. Many participants may choose to use LEXSYS after duty hours at home. The Director, Information Management, Department of the Army, published guidance for the use of personal computers and software in a Letter, dated 3 April 1987. The guidance provides that personal computers may be used to conduct Army business, but that the files or data produced belong to the government. Furthermore, an individual using his personal computer for government work, such as LEXSYS, may not request remuneration for expenses incurred. All licensed copyrights for software should be strictly observed.

b. Additional restrictions are provided in the 3 April guidance. Proponent establishing issue subnets and bringing new experts into a subnet should refer to this guidance. Pertinent sections of the guidance should be provided to all LEXSYS users.

c. The guidance provided by the Director, Information Management does not restrict LEXSYS operations. In fact, the guidance provides a great degree of latitude in using personal computers at a convenient time and place for expert participants.

G. Training Requirements.

1. Concept. The training concept is designed to enable the senior executive, the Issue Facilitator, and the system participants to use the system. It will establish a baseline of competency among LEXSYS participants. Training for the senior executive will be based on the need of the senior executive and will require a different training methodology than required for the participant or the Issue Facilitator. The ideal training method is a classroom situation with actual hands on computer assisted instruction. However, due to the anticipated geographical dispersion of the many participants, a program text with computer assisted instruction will be necessary. The program text with interactive computer assisted instruction can be enhanced through a coach and pupil methodology assuming other participants with computer teleconferencing skills are located in the same geographical area.

2. Assumptions

a. The principal communications mechanism to support the interaction of geographically dispersed participants will be the CONFER II software running in a mainframe environment.

b. Participants will use military or personal microcomputers and software to communicate within LEXSYS system.

c. The means to communicate between the mainframe environment and the macro-environment will be government or civilian telephone circuits or communications networks with modem interface.

d. LEXSYS participants will have varying degrees of competency in computer use and computer teleconferencing.

e. The Directorate of Information Management (DOIM) at each installation will be able to provide technical expertise and hardware if available and required for the participant.

3. Levels of Training. Several training factors that must be considered to establish a baseline of competency among LEXSYS participants and facilitators. These include the nature of the Living Expert System, what it can and cannot do; the roles of Issue Facilitators, the participants, and the senior executives; training in the nature and application of specific software packages supporting specific requirements; training to develop an efficient capability to use CONFER II; and specific training of Issue Facilitators.

a. Understanding the Nature of LEXSYS. Unless all the participants of LEXSYS understand the true nature and role of LEXSYS, the group will not be able to function to its full potential. Some of the elements of this training include:

(1) **The role of the senior executive.** An understanding of how the senior executive should perform (or desires to perform) as part of a LEXSYS team is an important consideration. The manner in which senior executives interact with a study group are important to the group dynamics of the conference and may ultimately determine the success or failure of the study. The General Officer courses at Ft. Leavenworth

and Maxwell Air Force Base provide an excellent opportunity for familiarizing and training senior executives on the use of computer conferencing techniques.

(2) The role of the LEXSYS Issue Facilitator (IF). The IF must learn how to organize the group, control the issues, help maintain the group dynamics in an asynchronous mode, and use the software tools available through CONFER II. The IF has many other functions to perform, such as organizer, administrator, agenda keeper, and facilitator of the issues. The CONFER II Organizer's Guide is essential for the training and development of the IF. The IF must be competent in all the skills required of an individual participant.

(3) Role of the individual LEXSYS contributor. Each participant, although geographically separated from other participants, becomes a member of a LEXSYS work group and, as such, needs to have an understanding of group dynamics and the appropriate behavior and norms associated with computer teleconferencing. He must understand the decision making process and the aids available to support that process. The key to a successful LEXSYS group interaction is each individual's competence in the use of CONFER II. Familiarity with the command structure and capabilities of CONFER II is essential. Training must address both basic and advanced use of CONFER II.

b. Methods of Conducting Training. Instruction can be conveyed to the LEXSYS participants in a variety of methods. Particular methods will be situation dependent, taking into

account the related factors of time, distances, target audience, and costs. Both individualized and small-group instruction are appropriate.

(1) **Classroom Instruction.** This approach is the most effective, but it is the most costly in terms of time and personnel resources and is not envisioned to be the primary method. However, if participants are selected from a central location, such as a formal resident school, then the classroom method may be the best approach. This approach is best utilized at schools such as CAS³ or CGSC.

(2) **Programmed Texts and Reference Manuals.** Programmed texts provide reinforcement of teaching objectives and allow students to work at their own pace. Programmed texts can be used simultaneously with other methods to achieve enhanced results. Computer Aided Instruction (CAI) can be utilized to enhance the program text method using a software tutorial of basic and advanced commands. Reference manuals are self explanatory and may be studied or utilized for refresher training or advanced training.

(3) **Coach-Pupil Method.** Although not a classroom method, this method is most efficient and effective when used in conjunction with a programmed text method and/or CAI software tutorials. The coach-pupil method achieves the fastest results and should be used when there are other participants in the same geographical area who possess teleconferencing skills. This is the best method for senior executives in order to

achieve maximum effectiveness and efficiency of the senior executive's limited time. This is the preferred method for training the Issue Facilitator.

(4) Computer Aided Instruction (CAI). This method of training is very desirable and may be accomplished in several ways. Computer simulation is, perhaps, the best method to use in a classroom environment. Disk-based tutorials and microcomputer terminal help references are two methods which facilitate independent training outside of the classroom.

(a) Disk-Based Tutorials. This is the preferred system and should be developed and utilized with a programmed text and enhanced with the coach-pupil method when possible. An excellent example of a disk-based tutorial is the telecommunications manual prepared jointly for the Engineer Officer Advanced Course and the Army Research Institute by EG&G Idaho, under DOE Contract Number DE-AC07-761D01570. This tutorial is designed to teach teleconferencing with standard hardware provided by the Engineer School and standard software using CONFER II as the conference mainframe software. This program can be adapted to LEXSYS; however, the design of LEXSYS specifies that participants may use their own hardware. It is not feasible to write programs for all possible hardware or for the Army to issue all participants a microcomputer or communications terminal for their use.

(b) Microcomputer Terminal Help References. The software for LEXSYS should provide the capability to

review what commands are available and the instructions for performing specific functions to communicate and analyze information. In addition to supporting the local use of the software running on the microcomputers, this type of assistance could also include local help for remotely used software packages. For example, help information for the use of CONFER II could reside in the local microcomputer environment, thereby saving transmission charges and line time accruing from downloading the help information from the host.

H. Rewards. To a large extent, LEXSYS is dependent on the voluntary participation of its members who are willing to contribute without tangible rewards. Nevertheless, the leadership of the Army and the specific senior executives who have called on the LEXSYS experts are also obligated to provide some recognition for this voluntary service. An analysis of how to recognize and reward experts for their participation surfaced a number of rewards likely to be effective in maintaining a high level of motivation and staying power for LEXSYS participants.

Access to information is the primary incentive, since most experts are continually seeking new information to update their level of expertise and professional development. The opportunity to participate in issue-solving and decision-making at the highest levels of the Army is another attractive incentive to participating experts. LEXSYS experts seem to value their input and find it personally rewarding to be able to influence decisions which help shape and mold the service.

Tangible rewards suggested include such things as letters of appreciation, letter input by senior executives to evaluation reports, subscriptions to professional journals, and achievement or service awards. Monetary rewards for civilians and retirees should be investigated by future LEXSYS developers. Some subject-matter experts in the civilian community depend upon their expertise for income. To ask such individuals to participate without financial remuneration may preclude their involvement. These are relatively inexpensive rewards for the Army. These costs are offset by the increased expertise available to senior executives.

PART III.
PROTOTYPE

THE LIVING EXPERT SYSTEM

PART III

PROTOTYPE

The most important evaluation of a new system is derived from the results of tests which replicate, as close as possible, real world conditions. The objectives of this prototype were to determine the practicality of expert computer teleconferencing and to monitor the process for effectiveness and efficiency. The prototype test bed was designed to evaluate the validity of each component of the concept. Design emphasis was on technological supportability and affordability. Although LEXSYS has the potential to accomplish many tasks, this prototype LEXSYS net was established to serve as a study group to address a "real-world" issue at the direction of a senior executive. Senior leadership sponsorship is considered essential for the success of LEXSYS. The senior leader must see the practicality and utility of the system, especially during periods of time when many worthwhile requirements compete for limited resources. For this reason, the issue selected for study originated in the Deputy Chief of Staff, Operations. The design facilitated the personal participation or observation of key senior executives involved or interested in this study.

Once the issue was determined, a small talent pool was identified as potential participants. For the purposes of this

prototype, the majority of the experts were identified using a survey instrument (Appendix A) at the Army War College. Additionally, other experts were identified using resources which included the Total Army Personnel Agency (TAPA), functional proponents, personal recommendation of knowledgeable individuals by the issue originator, and the Forum Network. Computer literacy was not a prerequisite for selection. Based on the issue selected and the objectives of the prototype, it was determined that the LEXSYS prototype work group would be approximately ten voluntary participants. The size of the prototype net was considered to be large enough to ensure desired synergism, yet small enough to manage effectively for a first time, one time test of the system capabilities.

For the conduct of this test, the Army War College LEXSYS Study Group served as the LEXSYS Manager and assisted the Issue Facilitator from DCSOPS. The Study Group's involvement in these critical components of LEXSYS afforded team members the opportunity to closely monitor the prototype process. Additionally, the use of Study Group members in these key net leadership positions minimized external resources, personnel, and training requirements.

Once the issue was clearly defined and participants were identified, the LEXSYS Manager and the Issue Facilitator were responsible for ensuring that the work group was linked electronically, organized, and trained for participation in the net. Training packages for participation in the prototype net were

tailored to meet the varying needs of individual participants (Appendix B). The analysis of information entered on the LEXSYS net by identified participants was the responsibility of the Issue Facilitator. The Issue Facilitator functioned as a leader, manager, administrator, facilitator of decision, and integrator of concepts and ideas. Thus, the Issue Facilitator functioned as the "Chief of Staff" and provided the results to the senior executive who requested or directed the study. The length of time that this prototype network was expected to operate was dependent on these factors:

- Time constraints imposed by project completion milestones.
- The nature and complexity of the selected issue.
- The depth of the research desired.
- The purpose of the prototype effort.

Following an assessment of these factors, and for practicality, the LEXSYS Study Group determined that the prototype network should operate for approximately two weeks.

In designing the prototype, we attempted to develop a system which was simple to operate and as nonthreatening as possible. The prototype was not designed to validate the state of computer teleconferencing science but was designed instead to validate the process of sharing expert information using asynchronous computer communications. It was conducted in accordance with the LEXSYS process described previously in Part IIb.

Following prototype operations, a detailed After Action Review was conducted to determine the effectiveness of the process, rather than a commentary on the quality of the expert information generated on the system. A complete analysis of prototype operations (PROTOLEX) is included in Appendix C. Some of the key results of the prototype follow:

- Participants agreed that the test was both informative and worthwhile.

- The issue proponent believes that there is a great deal of merit in using LEXSYS and that he was provided with new ideas/thoughts on the issue which will be useful in completing an Army position paper.

- Although the time allocated for the PROTOLEX was relatively short, considerable information was exchanged and significant progress was made toward problem resolution.

- Management of the LEXSYS issue subnet is critical to its success and requires an IF who possesses skill in conference management techniques and can devote time to issue facilitation.

- The issues of concern for the Army's senior leaders are broad in scope and involve political, economical, international, or social perspectives which will require an expanded LEXSYS data bank.

- Although only 10 of 30 AWC experts volunteered to participate, this is a clear indication that there is a significant portion of the expert population that will voluntarily participate in such a process. This propensity to participate may be very

representative of a fully operational LEXSYS. Discussions with those who elected not to participate indicated that they would be willing to participate at times when their workload permitted them to contribute.

- Subnet participation analysis clearly indicated a willingness to participate. One-third of the experts participating made more than three "responses" in the discussion. Two points are key. First, the volume of "responses" is not criteria for successful issue resolution or an indication of subnet success. Second, the level of activity experienced in PROTOLEX is not considered unusual for a teleconferencing system or a round-table meeting.

- The prototype was considered successful even with significant distractors such as Military Study Program completion requirements for the War College students, leaves, TDY, and assigned duties.

PART IV.

**ADVANTAGES AND
POTENTIAL DISADVANTAGES**

THE LIVING EXPERT SYSTEM

PART IV

ADVANTAGES AND POTENTIAL DISADVANTAGES

LEXSYS offers potential advantages for the Army to capitalize on computer technology as it moves into the 21st century. LEXSYS in conjunction with computer and video telecommunication possesses great potential. Nevertheless, senior executives and their action officers must promote and have confidence in LEXSYS. The support and confidence of senior executives will emerge if the potential advantages are quantified and positive results are obtained in the initial stages of LEXSYS.

1. Advantages.

a. **Expert Pool.** LEXSYS computer telecommunications expands the availability of experts participating because time and distance barriers are removed.

b. **Convenience.** LEXSYS telecommunications is asynchronous.

c. **Historical Record.** LEXSYS computer telecommunications allows for a readily available printed transcript of expert responses on the issue. This allows the Issue Facilitator or senior executive the opportunity to analyze the "hows" and "whys" of a recommendation.

e. **Cost Benefits.** LEXSYS computer telecommunications possesses greater potential for generating cost savings.

f. **Flexibility.** LEXSYS computer telecommunications allows for the number of participants to be increased without distracting from the decision process.

g. **Identifying Experts.** LEXSYS would identify experts in that vast Army talent pool of human resources (to include retired personnel) that possess various degrees of expertise in numerous subject areas; therefore, it permits the Army to maximize and capitalize this resource.

h. **Enhance Army Capabilities.** The senior leadership of the Army could enhance the overall capabilities of the Army by capitalizing on and using various levels of expertise in the Army as a respondent group for a quick turn around survey, as a study group addressing a problem or issue in detail, to produce findings and recommendations, and act as a sounding board for the initial formulation of a concept. LEXSYS may overcome problems encountered in earlier programs, such as DIVAD and COHORT.

i. **Staff Procedures.** LEXSYS does not replace current command staff procedures. Rather, LEXSYS provides an additional decision support resource.

j. **Method of Communication.** LEXSYS is not tied to one single method of communication. The methods for bringing LEXSYS experts together include computer telecommunications, video telecommunications, telephone, mail, and face-to-face meetings. Of these means of communication, computer telecommunications has the most potential advantages.

2. Potential Limitations of LEXSYS. LEXSYS is clearly a potentially powerful problem solving mechanism for senior executives. Presently, LEXSYS does possess some limitations; however, these limitations do not negate the advantages. Also, as LEXSYS expands and senior executives and action officers using LEXSYS gain confidence in LEXSYS and witness the quality responses the system is capable of producing, these limitations will be overcome. The possible potential limitations identified by the analysis of the LEXSYS concept are as follows.

a. Voluntary Participation. Voluntary participation provides the best working relationship when using LEXSYS in the problem solving process; however, the regularly assigned duties of some voluntary experts may at times prevent them from working in depth on specific issues. Also, the command climate could resist selected experts participating in LEXSYS. So individuals may avoid participation if they perceive that participating merely causes extra work. Likewise, if they are forced to participate, they may not openly express ideas or objections in the conferencing process. These extreme reactions could cause LEXSYS to provide improper or inadequate data.

Further, under voluntary participation, the normal influence of intermediate commanders may be lost to senior executives. After all, the information flow in LEXSYS does not follow chain of command channels. As a result, the issue

proponent cannot assume that the opinions of LEXSYS participants are shared by the participants' commanders.

b. Impersonal Communication. Computer teleconferencing eliminates face-to-face contact normally available during a centralized meeting. The usual indicators of disagreement, support, and acceptance normally noted through the verbal and non-verbal communication are not available. The absences of group dynamics experienced during face-to-face meetings may limit the potential of the system. Other conferencing difficulties may develop, such as tardy responses or equipment failure.

c. Computer Literacy. If computer teleconferencing is used, the Issue Facilitator must understand how to facilitate subnet operations, how to apply computer conferencing techniques, and how to control subnet operations via the computer. Also, the IF must know and apply more computer commands than the participating experts. Using computer teleconferencing requires the Issue Facilitator to send messages, post bulletins, add experts to the subnet, poll the experts on positions, and extract information from the subnet data base. If the Issue Facilitator is unable to accomplish these tasks, their subnet will operate without direction and will fail to resolve an issue through computer teleconferencing.

d. Responsiveness to Short Term Issues. LEXSYS is designed to open and close subnets for resolution of specific issues. LEXSYS will not operate as a continuous teleconferencing net with all identified experts on call to participate when

problems are identified. Before placing an issue on a subnet, experts must be identified and the experts may require training. Also, issue parameters must be defined and placed on the subnet. This process requires start-up time before computer teleconferencing is used to address an issue. Any issue that requires an immediate turn-around can be answered through existing LEXSYS subnets, however, the opinions provided may not be those of the experts on the issue.

e. Working Outside Command Lines. A command climate opposed to individuals assigned to the unit working issues outside the immediate command could be an effective deterrent to LEXSYS participation. But the support and confidence of senior executives will eliminate this problem as LEXSYS gains acceptance by senior executives. Also, LEXSYS creates far less impact on an organization than the current practice of forming special study groups which may distract from working issues within the immediate command.

PART V.
PROMOTING LEXSYS

THE LIVING EXPERT SYSTEM

PART V

PROMOTING LEXSYS

The potential of LEXSYS has been clearly recognized regardless of whether or not the Army approves the concept for implementation. For the potential of LEXSYS to be fully realized, senior executives and subordinates must understand the system, have confidence in the system, use the system themselves, and encourage LEXSYS use throughout the Army.

LEXSYS is evolutionary and not revolutionary. We know that bright minds are continuously communicating in the Army. LEXSYS is simply an attempt to capitalize on technology to capture the expertise of military and civilian personnel who are spread throughout the Army. Senior executives in the Army could use this expertise to act as a respondent group for a quick turn-around survey, to act as a study group addressing a problem or issue in detail and in depth, to produce findings and recommendations, or to act as a sounding board for the initial formulation of a concept. In order to have experts throughout the Army to complete a survey, conduct a study, or serve as a sounding board for the Army's senior leadership, the experts must be identified and brought together. Current methods for bringing experts together include computer teleconferencing, audio video telecommunications, telephone, mail,

and face-to-face meetings. The analysis of the LEXSYS concept clearly demonstrates the potential of computer teleconferencing as one of the primary means of capitalizing on the Army's available talent pool.

In order for the Army to realize the full potential of LEXSYS, senior executives and their action officers must become champions of LEXSYS. To gain credibility, LEXSYS must provide a group of experts who respond competently and quickly to generate input which assists the senior executive to produce findings and recommendations. Likewise, the action officers addressing the issues for senior executives must understand the system and feel comfortable with LEXSYS. If LEXSYS can produce viable results, it will gain validity throughout the highest levels of the Army.

In addition, an understanding of what has been accomplished by other government agencies and civilian enterprises to bring experts together through computer teleconferencing will help foster a better understanding of the LEXSYS concept. This understanding further demonstrates LEXSYS's potential. Furthermore, the practicality of LEXSYS as a means of bringing experts together can not be overstated. Finally, senior executives must be aware of LEXSYS's overall advantages, yet they must also appreciate the system's limitations before we can expect them to be champions of the system.

Computers are here to stay--supporting technology doubles every 18 months.¹ Other governmental agencies and civilian

enterprises are capitalizing on the development of computer technology. Computer teleconferencing is often used in every facet of the scientific and business world. Furthermore, computer telecommunication procedures are gaining momentum; and the business community continues to improve and use computer telecommunications to further business enterprises, communicate problem solving techniques, and reduce the requirement for travel. The complexity of military business continues to drive the military towards using computers to communicate, store, produce, and synthesize information.

Several years ago, the Institute for the Future observed more than 18 organizations using teleconferencing procedures.² Included in these 18 organizations were the U.S. Geological Survey, Charles F. Kettering Foundation and National Aeronautics and Space Administration. These organizations used the Planning Network (PLANET) system. PLANET is a simplified version of the FORUM computerized conferencing system. The Institute for the Future addressed several salient points in this study. First, the cost was determined to be about \$38 per user per month over an 18 month period.³ Second, the study pointed out the necessity for preplanning because it is just as important in computer conferences as in face-to-face meetings. Third, strong leadership is essential for effective use of computer conferencing. The two types of leadership functions that emerged in this study were organizing and facilitating. Last, the study pointed out that there is no single set of rules

for effective computer conferencing. Each organization must develop its own.⁴

Another exemplary computer telecommunications system example is the Electronic Information Exchange System (EIES). EIES was developed by the National Science Foundation Division of Information Science and Technology. EIES was used by the National Library of Medicine to update the hepatitis data base.⁵ The update of the hepatitis data base involved a group of ten viral hepatitis experts who worked this problem over a period of about seven months. A total of 194 on line hours were used by the hepatitis experts in addressing this problem. The median time for each of the ten experts was about 16 hours.⁶ The total hours used by each of these experts ranged from 4.5 hours to 66 hours.⁷ In addition, the Joint Election Device Engineering Council (JEDEC) sponsored by the Electronic Industries Association used the EIES computer telecommunication conference to promote hardware and software standardization in microprocessor/large scale integration products. Three major advantages were derived from the use of computer telecommunications.⁸ First, computer telecommunication is asynchronous, which simply means participants in the computer telecommunications net may enter and retrieve material from the system at their own convenience without having to be on line at the same time as other participants. Second, computerized teleconferencing provides a complete written transcript of what has been discussed. Third, the process of meeting and

coming to a decision is improved. Under normal face-to-face meetings, it could take up to two years for a standard to be set for microprocessor/large scale integration products.

Another example of computer telecommunication involves the legislatures of 25 states.⁹ These government bodies used the EIES system to exchange inquiries, responses, and leads about scientific and technical matters of interest to state legislatures. Stuart A. Umpleby, in Electronic Communication: Technology and Impacts, indicated the average person needs about ten hours to learn how to use the EIES system. To become skillful communicators and organizers in the EIES system takes about 100 hours.¹⁰ However, LEXSYS computer teleconferencing is not so complicated. If it is not kept simple, then LEXSYS computer teleconferencing will be extremely difficult to promote among senior executives, action officers, and expert participants. Also, if the system is too complicated, users may revert to mail, telephones, or face-to-face meetings which will result in the loss of the potential benefits associated with computer teleconferencing. The overall practicality of LEXSYS requires the system to be user friendly and responsive.

LEXSYS is practical, since it provides a methodology for senior executives to capitalize on the vast pool of personnel who possess various degrees of expertise in numerous subject areas beyond the immediate staff of senior executives. LEXSYS does not replace current command and staff procedures; rather, it provides an additional decision support resource available

to senior executives who desire to use LEXSYS. The system is designed to be as user friendly as available technology will allow. The Army currently possesses many systems that require minimum training for net participants. The practicality of LEXSYS is further enhanced because it is not totally dependent upon computer teleconferencing to adequately function. Experts can be brought together by mail, face-to-face meetings, and telephone. Ultimately the goal is that many experts will find using a computer based teleconferencing system to participate in LEXSYS almost as easy and convenient as using a telephone.

There are certainly cost benefits associated with the use of computer teleconferencing. Those cost benefits associated with capitalizing on the Army's knowledge capital are difficult to quantify; however, cost benefits associated with other aspects of using computer teleconferencing can be quantified. In Network Nation Human Communications Via Computers, the authors state: "Cheaper and more convenient than travel, it is an extremely flexible mode of communication as to time, place, and pace. At eight dollars per hour per participant, it is already less costly than an ordinary long-distance phone call."¹¹ Furthermore, the authors state, "In practically any economic way of examining this technology [computer teleconferencing] we find the potential for competition and substitution for other communication forms."¹² Certainly the potential for savings by the Army is practical. Some savings are more quantifiable than others. In particular, time and TDY expenditures are readily quantifiable.

Presently, the cost associated with working an issue for one year that involves 50 experts would be no more than \$15-20K. By comparison, if the center of gravity for working the issue was Washington, D.C., two TDY trips by each of the participants would more than consume \$15-20K, not to mention the impact on participants' commands in regards to absences.

In summary, LEXSYS in conjunction with computer teleconferencing offers great potential. Nevertheless, senior executives and their action officers must gain confidence in LEXSYS and promote the system. If the potential of LEXSYS is to be realized by the Army (and potentially other services), senior executives and subordinates must understand the advantages and limitations of the system, have confidence in the system, and encourage the use of LEXSYS throughout the Army.

PART VI.

GLOSSARY

THE LIVING EXPERT SYSTEM

PART VI

GLOSSARY

ASYNCHRONOUS TELECONFERENCING: Participants in the computer telecommunications net may enter and retrieve material from the system at their own convenience without having to be on line at the same time as other participants.

CONFER II: A multipurpose communications system with a unique conferencing component, messaging component, a bulletin board capability, and the capacity for interfacing with most personal computers.

FORUM: A computer teleconferencing network using CONFER II based on Wayne State University mainframe computer. Currently has 1500 members organized into 27 different subnets, each serving as an adjunctive staff in some given area. These members are geographically and organizationally dispersed and they communicate through personal computers.

ISSUE FACILITATOR: Key operator in the LEXSYS program. Functions as a leader, manager, administrator, facilitator of discussion, and integrator of concepts and ideas. Functions as the "Chief of Staff," and provides the results to the senior leader who has requested or directed the work effort.

LEXSYS DATA BANK: A historical file of issues worked on the LEXSYS net to include discussion material, solutions, and recommendations.

LEXSYS MANAGER: Located in the Decision Systems Management Agency (DSMA), Office of the Vice Chief of Staff of the Army, this individual is responsible for the maintenance of the expert data base, authorizes the establishment of computer subnets, catalogues issues, maintains a historical record of discussions as well as a real time record, and serves as a training coordinator for the Issue Facilitator.

TALENT DATA BANK: An active file of available experts and their credentials maintained by the LEXSYS Manager.

THE LIVING EXPERT SYSTEM

ENDNOTES

1. "Automatic Data Processing." Military Logistics Forum, Vol. 4, October 1978, pp. 15-18.
2. Institute for the Future, Group Communications Through Computers. Vol. 4: "Social, Managerial and Economic Issues." 1978. p. 131.
3. Ibid., p. 142.
4. Ibid., p. 153.
5. Henderson, Madeline M. and MacNaughton, Marcia J., ed. Electronic Communication: Technology and Impacts. Boulder: Westview, 1980. p. 87: "Use of Computer Conferencing to Validate and Update NLM's Hepatitis Data Base," by Elliot R. Siegel.
6. Ibid., p. 91.
7. Ibid.
8. Ibid., p. 98. "JEDEC/EIES Computer Conferencing for Standardization Activities," by Peter Johnson-Lenz.
9. Ibid., p. 103. "Legi Tech/EIES: Information Exchange Among State Legislative Researchers," by Peter Johnson-Lenz.
10. Ibid., p. 56. "Computer Conference on General Systems Theory: One Year's Experience," by Stuart A. Umpleby.
11. Hiltz, Starr Roxanne and Turoff Murray, The Network Nation Human Communication Via Computer. Reading: Addison-Wesley 1978. p. xix "Foreword" by Suzanne Keller.
12. Ibid., p. 420.

THE LIVING EXPERT SYSTEM

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APPENDICES

THE LIVING EXPERT SYSTEM

APPENDIX A

LIVING EXPERT SYSTEM (LEXSYS) BASELINE ASSESSMENT SURVEY

The LEXSYS study group used a survey instrument to identify and catalog experts on the faculty and students of USAWC class of 1988. Two previous surveys provided a starting point in the development of this survey for LEXSYS. In the early 1970's, the USAWC had a similar survey for determining the various expertise of students. Also, in 1975, the Command and General Staff College developed a survey to determine student and faculty expertise. After studying these surveys, the study group formulated a baseline survey for determining and identifying experts for LEXSYS.

The survey addressed 16 major areas. These areas ranged from structuring the force to foreign area expertise. The participants rated their level of expertise according to application, understanding, knowledge, familiarity, and awareness (Range 1 to 9). The identification of 124 various subject areas within the 16 broad subject areas further narrowed the field of expertise of the respondents. (Tab A Survey)

The study group sent out 332 surveys, of which 167 were returned. Equally important, the respondents wrote in subjects in which they felt they had expertise which were not included in the questionnaire. Tab B lists subjects identified by

respondents as areas of expertise, but not originally included in the survey form. Tab C gives the frequencies of response by each of the 124 various subject areas. The LEXSYS study group elected to define an expert as someone having an application and understanding level of knowledge (Level 1-3). An analysis of the results indicate extremely reliable measurements of the categories listed. However, it is very difficult to discriminate between subjects in Range 5 to 9 (knowledge to awareness).

The LEXSYS baseline assessment survey accomplished the overall objective of the LEXSYS study group--the development of a rather simple procedure to readily identify and catalog experts. The study group recognized that the survey is just a beginning; but through refinement, the survey will provide a method to identify Army experts by surveying AWC classes, CGSC classes, and CAS3 classes. The study group recommends the survey as a baseline expert identification assessment process and that it be further refined if results of analyzing future responses warrant such action.

An analysis of the survey and the results obtained were provided to LTC Jim Carey of the FORUM office. Results are keyed to faculty and study distribution box numbers. Following the identification of those experts, it is anticipated that the LEXSYS Manager would formally ask as many of the experts as desired to become members of the Army "Living Expert" pool.



DEPARTMENT OF THE ARMY
UNITED STATES ARMY WAR COLLEGE
CARLISLE BARRACKS, PENNSYLVANIA 17013-5050



REPLY TO
ATTENTION OF


19 January 1988

MEMORANDUM FOR: FACULTY AND MEMBERS OF THE CLASS OF 1988

SUBJECT: Living Expert System (LEXSYS) Baseline Assessment Survey

1. This assessment survey is designed to identify expertise possessed by faculty and students at the U.S. Army War College. Faculty and students, based on their education, training, and experience, possess expertise in a variety of subjects. This survey will establish a pool of expertise that will serve as a model to establish and expand the Living Expert System (LEXSYS).
2. LEXSYS is a computer assisted, teleconferencing system designed to connect experts from across the country and around the world to address the most pressing needs of the Army. The intent is to capture the relative low cost of emerging computer communications technology to enhance the way Army staffs interact, communicate, analyze problems, and make recommendations while realizing cost savings to the Army. LEXSYS is designed to assist the Army's senior leaders in making major decisions by providing a mechanism to connect Army and civilian talent in support of the leadership's needs. LEXSYS will not replace staffs, but does provide senior leaders another information resource to help them achieve their goals and objectives.
3. At the direction of the Vice Chief of Staff of the Army, the U.S. Army War College is evaluating the benefits of LEXSYS. Several students in the Class of 1988 have selected this evaluation of LEXSYS as their Military Studies Project (MSP). Your responses will help these students identify expertise in the faculty and Class of 1988 and evaluate how well this survey measures that expertise. Please read the attached instructions and complete the survey as soon as possible. Completion time is approximately 20 minutes.
4. The students working on the LEXSYS MSP appreciate your time and response to this survey. Your assistance and support is essential as we determine the best and most cost effective method to use computer telecommunications to solve Army problems.

Atch


WILLIAM S. ORLOV
Colonel, Infantry
Secretary/Chief of Staff

A-A-1

TAB A (Survey Form)

INSTRUCTIONS

Mark in your box number on the enclosed answer sheet and on the last page of this survey.

Read carefully the list of subject areas down the left-hand side of each page. These are not meant to be all inclusive, but are to represent typical subject areas in which a three or four star senior leader may have a question or information gathering requirement. The roman numerals separate all subjects into 16 broad topic areas. When marking your mark sensed form, mark only those subjects which are numbered 4 through 159.

Study the Level of Expertise scales across the top of each page. These scales are illustrative of a range of experience and proficiency in each subject area. There are five levels of expertise: APPLICATION, UNDERSTANDING, KNOWLEDGE, FAMILIARITY, and AWARENESS. The following is a definition of each expertise level:

APPLICATION: This is the highest level of expertise. At this level, you could lead a study project, head a task force, provide counsel or answer a senior leader (3 or 4 star) question in this subject. If you are at this level, mark 1 on the mark sensed form.

UNDERSTANDING: This is the second level of expertise. At this level, you could write an essay or term paper, give a one hour class at the War College, objectively evaluate alternatives, or work actions in this subject at the DA, JCS or MACOM level. If you are at this level, mark 3 on the mark sensed form.

KNOWLEDGE: This is the third level of expertise. At this level, you could make a significant contribution to group discussion (theory, research, or data), give a 30 minute briefing, or could work actions at Corps or lower level. If you are at this level, mark 5 on the mark sensed form.

FAMILIARITY: This is the fourth level of expertise. At this level, you can read or listen smoothly, i.e. your background includes basic terms, concepts, and relationships. If you are at this level, mark 7 on the mark sensed form.

AWARENESS: This is the lowest level of expertise. At this level, you can do reading or listen to this subject, but with frequent pauses to recall meaning and relationships. If you are at this level, mark 9 on the mark sensed form.

For each of the subject areas, assess your own present level of expertise by marking the number on the answer sheet that corresponds to the answer you wish to give to that question. For example, if your answer is that you are at the "APPLICATION" level, mark the space numbered (1). If you are midway between "KNOWLEDGE" and "FAMILIARITY," mark space (6) for that question. Remember; make your self-assessment based on what you think is your level of expertise now. Please consider each area as a separate measure, disregarding your response on the previous items. Feel free to use any of the 9 ratings provided on the scale. Be objective.

Here are some general guidelines which will help you in responding to this survey.

- Don't get tangled up with definitions. If you are not sure of the meaning of a term or phrase, define it in your own words and respond according to what you think the term means.

- There are no right or wrong answers, nor are there any "trick" questions or hidden gimmicks.

- Try to be as objective as possible. Don't be hesitant about using the extremes of the scale if you feel that they apply.

- Try to keep from referring back to how you responded on previous questions.

- If you have a subject area of expertise which is not shown on the survey or if you are unsure where your expertise should be shown, select one of the given broad subject areas (Roman Numeral I through XVI). In one of the two blank spaces provided at the bottom of that subject area, write in the subject in which you have expertise, and circle the appropriate number directly on the survey form. For example, if you have APPLICATION expertise in the Light Division Structure, you would write Light Division Structure on line 11 and circle 1 under APPLICATION, directly on the survey form.

Thank you for your cooperation. Please return the survey form and the answer sheet promptly to the distribution slot in the Root Hall mailroom. Request you complete the survey by 29 January 1988.

LEADS SURVEY AT 80
LEVEL OF EXPERTISE

	APPLICATION LEAD A STUDY PROJECT; HEAD A TASK FORCE; PROVIDE COUNSEL OR ANSWER A SENIOR LEADER (1 OR 4 STAR) QUESTION IN THIS SUBJECT.	UNDERSTANDING WRITE ESSAY OR TERM PAPER; GIVE 1 HOUR CLASS AT THE WAR COLLEGE; OBJECTIVELY EVALUATE ALTERNATIVES; COULD WORK ACTION IN THIS SUBJECT AT DA, JCS OR MACOM LEVEL.	KNOWLEDGE MAKE SIGNIFICANT CONTRIBUTION (THEORY, RESEARCH, DATA) TO GROUP DISCUSSION; GIVE 10 MINUTE BRIEFING; COULD WORK ACTION AT CORPS OR LOWER LEVEL.	FAMILIARITY READ OR LISTEN SMOOTHLY, I.E. BACKGROUND INCLUDES BASIC TERMS, CONCEPTS AND RELATIONSHIPS.	AWARENESS READ OR LISTEN, BUT NOT FREQUENT PAUSES TO RECALL MEANINGS AND RELATIONSHIPS.
STRUCTURING THE FORCE INCLUDES:					
1. TOE OR TDA ACTIVATIONS.	1	2	3	4	5
2. TOE OR TDA INACTIVATIONS.	1	2	3	4	5
3. TOE OR TDA CONVERSIONS.	1	2	3	4	5
4. TOE OR TDA ADJUSTMENTS.	1	2	3	4	5
5. ACTIVE & RESERVE MILITARY FORCE	1	2	3	4	5
6. ACTIVE & RESERVE CIVILIAN FORCE	1	2	3	4	5
7. ACTIVE & RESERVE CIVILIAN FORCE	1	2	3	4	5
8. DOCTRINE DEVELOPMENT.	1	2	3	4	5
9. DOCTRINE DEVELOPMENT.	1	2	3	4	5
10. DOCTRINE DEVELOPMENT.	1	2	3	4	5
11. DOCTRINE DEVELOPMENT.	1	2	3	4	5
12. DOCTRINE DEVELOPMENT.	1	2	3	4	5
13. DOCTRINE DEVELOPMENT.	1	2	3	4	5
14. DOCTRINE DEVELOPMENT.	1	2	3	4	5
15. DOCTRINE DEVELOPMENT.	1	2	3	4	5
16. DOCTRINE DEVELOPMENT.	1	2	3	4	5
17. DOCTRINE DEVELOPMENT.	1	2	3	4	5
18. DOCTRINE DEVELOPMENT.	1	2	3	4	5
19. DOCTRINE DEVELOPMENT.	1	2	3	4	5
20. DOCTRINE DEVELOPMENT.	1	2	3	4	5
21. DOCTRINE DEVELOPMENT.	1	2	3	4	5
22. DOCTRINE DEVELOPMENT.	1	2	3	4	5
23. DOCTRINE DEVELOPMENT.	1	2	3	4	5
24. DOCTRINE DEVELOPMENT.	1	2	3	4	5
25. DOCTRINE DEVELOPMENT.	1	2	3	4	5
26. DOCTRINE DEVELOPMENT.	1	2	3	4	5
27. DOCTRINE DEVELOPMENT.	1	2	3	4	5
28. DOCTRINE DEVELOPMENT.	1	2	3	4	5
29. DOCTRINE DEVELOPMENT.	1	2	3	4	5
30. DOCTRINE DEVELOPMENT.	1	2	3	4	5
31. DOCTRINE DEVELOPMENT.	1	2	3	4	5
32. DOCTRINE DEVELOPMENT.	1	2	3	4	5
33. DOCTRINE DEVELOPMENT.	1	2	3	4	5
34. DOCTRINE DEVELOPMENT.	1	2	3	4	5
35. DOCTRINE DEVELOPMENT.	1	2	3	4	5
36. DOCTRINE DEVELOPMENT.	1	2	3	4	5
37. DOCTRINE DEVELOPMENT.	1	2	3	4	5
38. DOCTRINE DEVELOPMENT.	1	2	3	4	5
39. DOCTRINE DEVELOPMENT.	1	2	3	4	5
40. DOCTRINE DEVELOPMENT.	1	2	3	4	5
41. DOCTRINE DEVELOPMENT.	1	2	3	4	5
42. DOCTRINE DEVELOPMENT.	1	2	3	4	5
43. DOCTRINE DEVELOPMENT.	1	2	3	4	5
44. DOCTRINE DEVELOPMENT.	1	2	3	4	5
45. DOCTRINE DEVELOPMENT.	1	2	3	4	5
46. DOCTRINE DEVELOPMENT.	1	2	3	4	5
47. DOCTRINE DEVELOPMENT.	1	2	3	4	5
48. DOCTRINE DEVELOPMENT.	1	2	3	4	5
49. DOCTRINE DEVELOPMENT.	1	2	3	4	5
50. DOCTRINE DEVELOPMENT.	1	2	3	4	5
51. DOCTRINE DEVELOPMENT.	1	2	3	4	5
52. DOCTRINE DEVELOPMENT.	1	2	3	4	5
53. DOCTRINE DEVELOPMENT.	1	2	3	4	5
54. DOCTRINE DEVELOPMENT.	1	2	3	4	5
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57. DOCTRINE DEVELOPMENT.	1	2	3	4	5
58. DOCTRINE DEVELOPMENT.	1	2	3	4	5
59. DOCTRINE DEVELOPMENT.	1	2	3	4	5
60. DOCTRINE DEVELOPMENT.	1	2	3	4	5
61. DOCTRINE DEVELOPMENT.	1	2	3	4	5
62. DOCTRINE DEVELOPMENT.	1	2	3	4	5
63. DOCTRINE DEVELOPMENT.	1	2	3	4	5
64. DOCTRINE DEVELOPMENT.	1	2	3	4	5
65. DOCTRINE DEVELOPMENT.	1	2	3	4	5
66. DOCTRINE DEVELOPMENT.	1	2	3	4	5
67. DOCTRINE DEVELOPMENT.	1	2	3	4	5
68. DOCTRINE DEVELOPMENT.	1	2	3	4	5
69. DOCTRINE DEVELOPMENT.	1	2	3	4	5
70. DOCTRINE DEVELOPMENT.	1	2	3	4	5
71. DOCTRINE DEVELOPMENT.	1	2	3	4	5
72. DOCTRINE DEVELOPMENT.	1	2	3	4	5
73. DOCTRINE DEVELOPMENT.	1	2	3	4	5
74. DOCTRINE DEVELOPMENT.	1	2	3	4	5
75. DOCTRINE DEVELOPMENT.	1	2	3	4	5
76. DOCTRINE DEVELOPMENT.	1	2	3	4	5
77. DOCTRINE DEVELOPMENT.	1	2	3	4	5
78. DOCTRINE DEVELOPMENT.	1	2	3	4	5
79. DOCTRINE DEVELOPMENT.	1	2	3	4	5
80. DOCTRINE DEVELOPMENT.	1	2	3	4	5

TABA (Survey Form)

LEXIS SURVEY A-8
LEVEL OF EXPERTISE

APPLICATION	UNDERSTANDING	KNOWLEDGE	FAMILIARITY	AWAWARENESS
LEAD A STUDY PROJECT; HEAD A TASK FORCE; PROVIDE COUNSEL OR ANSWER A SENIOR LEADER (3 OR 4 STAR) QUESTION IN THIS SUBJECT.	WRITES ESSAY ON TERM PAPER; GIVES LECTURE CLASS AT THE HIGH COLLEGE; OBJECTIVELY EVALUATE ALTERNATIVES; COULD WORK ACTION IN THIS SUBJECT AT DA, JCS OR MACOM LEVEL.	HAVE SIGNIFICANT CONTRIBUTION (THEORY, RESEARCH, DATA) TO GROUP DISCUSSION; GIVE 30 MINUTE BRIEFING; COULD WORK ACTION AT CORPS OR LOWER LEVEL.	READ OR LISTEN SMOOTHLY, I.E. BACKGROUND INCLUDES BASIC TERMS, CONCEPTS AND RELATIONSHIPS.	READ OR LISTEN, BUT WITH FREQUENT PAUSE TO RECALL MEANING AND RELATIONSHIPS.
IV. MOBILIZING & DEPLOYING THE FORCE INCLUDES:				
40. PREPARATIONS PRIOR TO M-DAY TO ENABLE FORCES TO EXPAND.	1	2	3	4
41. MOVEMENT OF PERSONNEL, EQUIPMENT & SUPPLIES TO THEATER OF OPS BY AIR.	1	2	3	4
42. MOVEMENT OF PERSONNEL, EQUIPMENT & SUPPLIES TO THEATER OF OPS BY SEA.	1	2	3	4
43. RESERVE MOBILIZATION.	1	2	3	4
44. NATIONAL GUARD MOBILIZATION.	1	2	3	4
45. REFORGER OPERATIONS.	1	2	3	4
46. POMCUS (LESS EQUIPMENT PROCUREMENT).	1	2	3	4
47. _____	1	2	3	4
48. _____	1	2	3	4
V. PROVIDING FACILITIES INCLUDES:				
49. CONSTRUCTION (MCA).	1	2	3	4
50. CONSTRUCTION (MINOR).	1	2	3	4
51. FAMILY HOUSING MANAGEMENT & MAINT.	1	2	3	4
52. MORALE, WELFARE & RECREATION FACILITIES.	1	2	3	4
53. ENVIRONMENTAL PROTECTION.	1	2	3	4
54. REAL PROPERTY MAINTENANCE.	1	2	3	4
55. _____	1	2	3	4
56. _____	1	2	3	4
VI. MANAGING INFORMATION INCLUDES:				
57. COMPUTER PROGRAMMING & OPERATIONS.	1	2	3	4
58. ALCOHOL AND DRUG CONTROL.	1	2	3	4
59. EQUAL OPPORTUNITY MANAGEMENT.	1	2	3	4
60. MILITARY PAY DISBURSEMENT.	1	2	3	4
61. CONTROLLER SERVICES.	1	2	3	4
62. COMMUNICATIONS-ELECTRONICS AUTOMATION.	1	2	3	4
63. COMMUNICATIONS-ELECTRONICS OPERATIONS.	1	2	3	4
64. COMMUNICATIONS-ELECTRONICS ENGINEERING.	1	2	3	4
65. JOINT COMMAND CONTROL COMMUNICATIONS.	1	2	3	4
66. _____	1	2	3	4
67. _____	1	2	3	4
VII. EQUIPPING THE FORCE INCLUDES:				
68. RESEARCH, DESIGN & TEST NEW EQUIPMENT.	1	2	3	4
69. DEVELOPMENT OF NEW EQUIPMENT.	1	2	3	4
70. ACQUISITION OF NEW EQUIPMENT.	1	2	3	4
71. DISTRIBUTION/FIELDING OF NEW EQUIPMENT.	1	2	3	4
72. _____	1	2	3	4
73. _____	1	2	3	4

TAB A (Survey Form)

LEADER'S SURVEY AT 90
LEVEL OF EXPERTISE

	APPLICATION	UNDERSTANDING	KNOWLEDGE	FAMILIARITY	AWARENESS
	LEAD A STUDY PROJECT, HEAD A TASK FORCE, PREVIOUS COUNSEL OR ANSWER A SENIOR LEADER (3) OR 4 STAR) QUESTION IN THIS SUBJECT	WRITE ESSAY OR TERM PAPER; GIVE 1 HOUR CLASS AT THE WAR COLLEGE; OBJECTIVELY EVALUATE ALTERNATIVES, COULD WORK ACTION IN THIS SUBJECT AT DA, JCS OR MACOM LEVEL.	MAKE SIGNIFICANT CONTRIBUTION (THEORY, RESEARCH, DATA) TO GROUP DISCUSSION; GIVE 30 MINUTE BRIEFING; COULD WORK ACTION AT CORPS OR LOWER LEVEL.	READ OR LISTEN SMOOTHLY, I.E. BACKGROUND INCLUDES BASIC TERMS, CONCEPTS AND RELATIONSHIPS	READ OR LISTEN, BUT WITH FREQUENT PAUSES TO RECALL MEANING AND RELATIONSHIPS
101	SUSTAINING THE FORCE INCLUDES	2	4	6	7
102	LEAD A STUDY PROJECT	3	4	7	8
103	HEAD A TASK FORCE	3	4	7	8
104	PREVIOUS COUNSEL OR ANSWER	3	4	7	8
105	A SENIOR LEADER (3) OR 4	3	4	7	8
106	STAR) QUESTION IN THIS	3	4	7	8
107	SUBJECT	3	4	7	8
108		3	4	7	8
109		3	4	7	8
110		3	4	7	8
111		3	4	7	8
112		3	4	7	8
113		3	4	7	8
114		3	4	7	8
115		3	4	7	8
116		3	4	7	8
117		3	4	7	8
118		3	4	7	8
119		3	4	7	8
120		3	4	7	8
121		3	4	7	8
122		3	4	7	8
123		3	4	7	8
124		3	4	7	8
125		3	4	7	8
126		3	4	7	8
127		3	4	7	8
128		3	4	7	8
129		3	4	7	8
130		3	4	7	8
131		3	4	7	8
132		3	4	7	8
133		3	4	7	8
134		3	4	7	8
135		3	4	7	8
136		3	4	7	8
137		3	4	7	8
138		3	4	7	8
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LEADS SURVEY AT 88
LEVEL OF EXPERTISE

APPLICATION	UNDERSTANDING	KNOWLEDGE	FAMILIARITY	ANALYSIS
LEAD A STUDY PROJECT, READ A PAPER, WRITE A PAPER, GIVE A PRESENTATION, OR ANALYZE A PROBLEM (ON A STAR) QUESTION IN THIS SUBJECT.	WRITE ESSAY OR TERM PAPER, GIVE 1 HOUR CLASS AT THE WAS COLLOQUE, OBJECTIVELY EVALUATE ALTERNATIVES, COULD WORK ACTION IN THIS SUBJECT AT DA, JCS OR NACOR LEVEL.	NAME SIGNIFICANT CONTRIBUTION (THEORY, RESEARCH, DATA) TO GROUP DISCUSSION; COULD GROUP DISCUSSION; COULD ACTION AT CORPS OR LOWER LEVEL.	READ OR LISTENED, SMOOTHLY, BASIC TERMS, CONCEPTS AND RELATIONSHIPS.	READ OR LISTENED, BUT WITH FREQUENT PAUSES AND RELATIONSHIPS.
1. INTELLIGENCE INCLUDES:				
104 COLLECTION	2	5	7	9
105 ANALYSIS	2	5	7	9
106 PRODUCTION	2	5	7	9
107 TACTICAL	2	5	7	9
108 STRATEGIC	2	5	7	9
109 INNOVATION	2	5	7	9
110 HUMAN	2	5	7	9
111 COUNTER INTELLIGENCE	2	5	7	9
112 SIGNALS INTELLIGENCE/ELECTRONIC	2	5	7	9
113 RESEARCH	2	5	7	9
114 RESEARCH & DEVELOPMENT OF INTELLIGENCE	2	5	7	9
115 COLLECTION MEANS	2	5	7	9
116	2	5	7	9
117	2	5	7	9
118	2	5	7	9
119	2	5	7	9
120	2	5	7	9
2. FIGHTING THE FORCE INCLUDES:				
121 LIGHT INFANTRY TACTICS	2	5	7	9
122 ARMORED FORCE TACTICS	2	5	7	9
123 AVIATION TACTICS	2	5	7	9
124 NUCLEAR WEAPONS CONTROL	2	5	7	9
125 COMBAT OPERATIONS REAR	2	5	7	9
126 DEFENSE OF MAP OPERATIONS	2	5	7	9
127	2	5	7	9
128	2	5	7	9
3. SPACE OPERATIONS INCLUDES:				
129 ACTIVITIES ASSOCIATED WITH THE USE &	2	5	7	9
130 DEVELOPMENT OF SPACE AS A THEATER OF	2	5	7	9
131 OPERATIONS	2	5	7	9
4. LAW AND LAW ENFORCEMENT INCLUDES:				
132 ADMINISTRATION OF MILITARY JUSTICE	2	5	7	9
133 INTERNATIONAL LAW	2	5	7	9
134 LEGAL ASPECTS OF GOVERNMENT PROCUREMENT	2	5	7	9
135 MAINTENANCE OF DISCIPLINE, LAW AND ORDER	2	5	7	9
136 REHABILITATION	2	5	7	9
137	2	5	7	9
138	2	5	7	9

A-A-7

TAB A (Survey Form)

LEADS SURVEY AT 90
LEVEL OF EXPERTISE

	APPLICATION AT THIS LEVEL, SUBJECT, LEAD A TASK FORCE, PROVIDE COORDINATE OR ASSIGNED A SENIOR LEADER (3 OR 4 STAR) QUESTION IN THIS SUBJECT	UNDERSTANDING WRITS BRAT OR TERM PAPER, GIVE 1 HOUR CLASS AT THE WAR COLLEGE, OBJECTIVELY EVALUATE ALTERNATIVES, COULD MORE ACTION IN THIS SUBJECT AT DA, JCS OR MACON LEVEL.	KNOWLEDGE MAKE SIGNIFICANT CONTRIBUTION (THEORY, RESEARCH, DATA) TO GROUP DISCUSSION; GIVE 30 MINUTE BRIEFING; COULD WORK ACTION AT CORPS OR LOWER LEVEL.	FAMILIARITY READ OR LISTEN SHOOTOUT, I.E. BACKGROUND INCLUDES BASIC TERMS, CONCEPTS AND RELATIONSHIPS.	ADVANCEMENT READ OR LISTEN, BUT WITH FREQUENT PASSES TO RECALL, UNDERSTAND AND RELATIONSHIPS.
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199	1	2	3	4	5
200	1	2	3	4	5

114 JOINT AND COMBINED OPERATIONS INCLUDES:

- 115 AIRSPACE CONTROL
- 116 COMBINED COMMAND
- 117 COMBINED COMMUNICATIONS AGENCY
- 118 INTERCOMMUNICATIONS AGENCY
- 119 JOINT AIR DEFENSE OPERATIONS
- 120 JOINT AIR DEFENSE PLANNING
- 121 JCS/JCS STAFF PLANNING
- 122 WORLD WIDE MILITARY COMMAND AND CONTROL SYSTEM

A-A-B

123 SECURITY ASSISTANCE INCLUDES:

- 124 ISOLATION OPERATIONS
- 125 INTERNAL DEFENSE AND DEVELOPMENT
- 126 NAAG/MISSION/INTEGRATION OPERATIONS
- 127 MILITARY ASSISTANCE
- 128 SECURITY ASSISTANCE TRAINING PROGRAMS
- 129 TERRORISM
- 130 UNCONVENTIONAL WARFARE

131 FOREIGN AREA (WRITS IN COUNTRY

132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200

Please write in your cell
Last number

TAB A (Survey Form)

2 February 1988

SUBJECT: WRITE IN RESPONSES TO LEXSYS SURVEY

A stated purpose of the LEXSYS Survey given to the faculty and Class of 1988 was to see how well the survey measured expertise. To that end, blank spaces were provided throughout the form so that respondents could add subject areas not already included in the survey instrument. The following is a compilation of those write in responses. Student numbers beside each subject indicate the frequency of each write in.

STRUCTURING THE FORCE:

Threat analysis	581
CINC support	581
Army Medical Dept. doctrine development	96
Congressional relations	
SOF	277
SOF doctrine development	277
Chaplain force structure	92
Strategy, plans and policy	532
Strategic planning	532
Medical force structure	61
Light division	412
Civilian structure	412
Force structure and test	73

MANNING THE FORCE

COHORT	202
AMEDD active and reserve recruiting	96
AMEDD " " " retention	96
Chaplain recruiting	92
Civilian personnel	412
Installation management	412

TRAINING THE FORCE

Training forces (Latin America)	168	277
Training forces in SWA		141
Training combat support forces in SWA		141
SOF training and foreign forces		277
Rifle marksmanship		249
Chaplain training at NTC		92
Chaplain/chaplain asst. training		92
Initial entry MOS training		188
Airborne operations		135
Civilian training		412
Latin American affairs		496
Third world affairs		496

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TAB B

MOBILIZING AND DEPLOYING THE FORCE

Chaplain mobilization	92
Port readiness	164
MAC enroute system	268

PROVIDING FACILITIES

Stationing	164
Master planning	164

MANAGING INFORMATION

EQUIPPING THE FORCE

Facilities for new equipment	164
Acquisition logistics	268
Redistribution	412

SUSTAINING THE FORCE

Pershing II support operations	43
Airborne force logistics	146
Airborne force movements	146
Chaplain religious coverage	92
Repair parts management	75
DLA operations	75
Allied logistics (FMS Latin America)	168
Installation requisition management	412

LEADERSHIP

Chaplain leadership	92
Civilian management	412

INTELLIGENCE

Topography	149
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FIGHTING THE FORCE

Air assault infantry tactics	137
Airborne operations	45
Chemical operations	550
Chemical/biological defense	550
Peace keeping operations	37
Cavalry operations recon/div/regt	124

SPACE OPERATIONS

SDI	409
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LAW ENFORCEMENT

JOINT AND COMBINED OPERATIONS

Defense Mapping Agency	149
Mapping and topographic operations	599
Air battle management	223
Return of POWs (VN DEV program)	124

SECURITY ASSISTANCE

Tactical PSYOP	41
Operational PSYOP	41
Direct action	277
Strategic recon	277
Equipment transfer (direct)	138
Funding	412

FOREIGN AREA

Italy	434
Middle East	436
Latin America	496, 499, 499, 277, 179, 171
Cuba	171
Turkey	491
Germany	447, 85, 188, 198
Philippines	518
Soviet Union	500, 489, 73, 564, 518, 546
South West Asia	141, 61
Africa	179
Columbia	168
South America	168, 247
Panama	168, 247
Egypt	37, 244
E. Europe	500, 489, 546, 403
W. Europe	500
Central America	247
France	85
Peoples Republic of China	73
Israel	37
Japan	251
Pacific Region	251
Korea	564
Middle East	596
Brazil	467

LEXIS SURVEY AT 88
LEVEL OF EXPERTISE

	APPLICATION LEAD A STUDY PROJECT, HEAD A TASKFORCE, PROVIDE COUNSEL OR ANSWER A SENIOR LEADER (3 OR 4 STAR) QUESTION IN THIS SUBJECT.	UNDERSTANDING WRITE ESSAY OR TERM PAPER, GIVE 1 HOUR CLASS AT THE WAR COLLEGE, OBJECTIVELY EVALUATE ALTERNATIVES; COULD WORK ACTION IN THIS SUBJECT AT DA, JCS OR MACON LEVEL.	KNOWLEDGE MAKE SIGNIFICANT CONTRIBUTION THEORY, RESEARCH, DATA TO GROUP DISCUSSION; GIVE 30 MINUTE BRIEFING; COULD WORK ACTION AT CORPS OR LOWER LEVEL.	FAMILIARITY REAL OR LISTEN SMOOTHLY, I.E. BACKGROUND INCLUDES BASIC TERMS, CONCEPTS AND RELATIONSHIPS.	AWAWARENESS READ OR LISTEN, BUT WITH FREQUENT PAUSES TO RECALL MEANING AND RELATIONSHIPS.
1 STRUCTURING THE FORCE INCLUDES: 1.1 TOE OR TDA ACTIVATIONS 2. TOE OR TDA INACTIVATIONS 3. TOE OR TDA CONVERSIONS 4. TOE OR TDA ADJUSTMENTS 5. TOE OR TDA RESERVE MILITARY FORCE 6. TOE OR TDA RESERVE CIVILIAN FORCE 7. ACTIVE & RESERVE DECISIONS 8. ACTIVE & RESERVE DECISIONS 9. ACTIVE & RESERVE DECISIONS 10. DOCTRINE DEVELOPMENT 11. DOCTRINE DEVELOPMENT 12. DOCTRINE DEVELOPMENT	1 1 1 1 1 1 1 1 1 1 1 1	3 3 3 3 3 3 3 3 3 3 3 3	5 5 5 5 5 5 5 5 5 5 5 5	7 7 7 7 7 7 7 7 7 7 7 7	3 3 3 3 3 3 3 3 3 3 3 3
13. NAMING THE FORCE INCLUDES: 13.1 ACTIVE & RESERVE RECRUITING 13.2 ACTIVE & RESERVE RETENTION 13.3 NATIONAL GUARD FORCES 13.4 IMPROVING QUALITY OF LIFE 13.5 PERSONNEL MANAGEMENT 13.6 CLUB MANAGEMENT 13.7 TROOP HOUSING REQUIREMENTS 13.8 OCCUPATIONAL SAFETY 13.9 HEALTH SERVICES 13.10 ARMY RESERVE STRUCTURE 13.11 RECEPTION CENTER OPERATIONS 13.12 RECEPTION CENTER OPERATIONS	1 1 1 1 1 1 1 1 1 1 1 1	3 3 3 3 3 3 3 3 3 3 3 3	5 5 5 5 5 5 5 5 5 5 5 5	7 7 7 7 7 7 7 7 7 7 7 7	3 3 3 3 3 3 3 3 3 3 3 3
14. TRAINING THE FORCE INCLUDES: 14.1 INDIVIDUAL TRAINING 14.2 UNIT TRAINING 14.3 TRAINING DEVELOPMENT & SUPPORT 14.4 THE ROTC PROGRAM 14.5 PROFESSIONAL MILITARY EDUCATION 14.6 SUPPORTING FORCES AT THE BTC 14.7 FIGHTING FORCES AT THE BTC 14.8 TRAINING FORCES IN EUROPE 14.9 TRAINING FORCES IN KOREA 14.10 TRAINING COMBAT SUPPORT FORCES 14.11 TRAINING COMBAT SUPPORT FORCES 14.12 TRAINING DEVICES	1 1 1 1 1 1 1 1 1 1 1 1	3 3 3 3 3 3 3 3 3 3 3 3	5 5 5 5 5 5 5 5 5 5 5 5	7 7 7 7 7 7 7 7 7 7 7 7	3 3 3 3 3 3 3 3 3 3 3 3

Tab C

APPLICATION	UNDERSTANDING	KNOWLEDGE	FAMILIARITY	AWARENESS
LEAD A STUDY PROJECT; LEAD A TASK FORCE; PROVIDE COUNSEL OR ANSWER A SENIOR LEADER (3) OR 4 STAFF QUESTION IN THIS SUBJECT	WRITE ESSAY OR TERM PAPER; GIVE 1 HOUR CLASS AT THE WAR COLLEGE; OBJECTIVELY EVALUATE ALTERNATIVES; COULD WORK ACTION IN THIS SUBJECT AT DA, JCS OR MACOM LEVEL.	MAKE SIGNIFICANT CONTRIBUTION (THEORY, RESEARCH, DATA) TO GROUP DISCUSSION; GIVE 30 MINUTE BRIEFING; COULD WORK ACTION AT COMPS OR LOWER LEVEL	READ OR LISTEN SMOOTHLY; RECALL BASIC TERMS, CONCEPTS AND RELATIONSHIPS.	READ OR LISTEN, BUT WITH FREQUENT PAUSE TO RECALL MEANINGS AND RELATIONSHIPS
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44	44	44	44	44
45	45	45	45	45
46	46	46	46	46
47	47	47	47	47
48	48	48	48	48
49	49	49	49	49
50	50	50	50	50
51	51	51	51	51
52	52	52	52	52
53	53	53	53	53
54	54	54	54	54
55	55	55	55	55
56	56	56	56	56
57	57	57	57	57
58	58	58	58	58
59	59	59	59	59
60	60	60	60	60
61	61	61	61	61
62	62	62	62	62
63	63	63	63	63
64	64	64	64	64
65	65	65	65	65
66	66	66	66	66
67	67	67	67	67
68	68	68	68	68
69	69	69	69	69
70	70	70	70	70
71	71	71	71	71
72	72	72	72	72
73	73	73	73	73
74	74	74	74	74
75	75	75	75	75
76	76	76	76	76
77	77	77	77	77
78	78	78	78	78
79	79	79	79	79
80	80	80	80	80
81	81	81	81	81
82	8			

- 40 MOBILIZING & DEPLOYING THE FORCE INCLUDES
- 41 PREPARATIONS PRIOR TO M DAY TO ENABLE
- 42 FORCES TO EXPAND
- 43 MOVEMENT OF PERSONNEL, EQUIPMENT &
- 44 SUPPLIES TO THEATER OF OPS BY AIR
- 45 MOVEMENT OF PERSONNEL, EQUIPMENT &
- 46 SUPPLIES TO THEATER OF OPS BY SEA
- 47 RESERVE MOBILIZATION
- 48 NATIONAL GUARD MOBILIZATION
- 49 REFORGER OPERATIONS
- 50 POCUS (LESS EQUIPMENT PROCUREMENT)

4. PROVIDING FACILITIES INCLUDES:

- 49. CONSTRUCTION (HCA).
- 50. CONSTRUCTION (HMOB).
- 51. FAMILY HOUSING MANAGEMENT & MAINT.
- 52. MORALE, WELFARE & RECREATION FACILITIES.
- 53. ENVIRONMENTAL PROTECTION.
- 54. REAL PROPERTY MAINTENANCE.

1. MANAGING INFORMATION INCLUDES:
 54. COMPUTER PROGRAMS & OPERATIONS.
 55. ALCOHOL AND DRUG CONSUMPTION.
 56. CRIMINAL RECORDS.
 57. MILITARY SERVICE RECORDS.
 58. MILITARY DISMISSEMENT.
 59. CONTROLLER SERVICES.
 60. COMMUNICATIONS-ELECTRONICS AUTOMATION.
 61. COMMUNICATIONS-ELECTRONICS OPERATIONS.
 62. COMMUNICATIONS-ELECTRONICS ENGINEERING.
 63. COMMUNICATIONS-ELECTRONICS OPERATIONS.
 64. JOINT FORWARD CONTROL COMMUNICATIONS.

71. EQUIPPING THE FORCE INCLUDES:
68 RESEARCH, DESIGN & TEST NEW EQUIPMENT.
69 DEVELOPMENT OF NEW EQUIPMENT.
70 ACQUISITION OF NEW EQUIPMENT.
71 DISTRIBUTION/FIELDING OF NEW EQUIPMENT.
72
73

TAB C

LEISIS SURVEY AT 88
LEVEL OF EXPERTISE

APPLICATION	UNDERSTANDING	KNOWLEDGE	FAMILIARITY	ANALYSIS
LEAD A STUDY PROJECT; HEAD A TASK FORCE; PROVIDE COUNSEL OR ASSIST A SENIOR LEADER (3 OR 4 STAR) QUESTION IN THIS SUBJECT.	WRITE ESSAY OR TERM PAPER; GIVE 1 HOUR CLASS AT THE MAP COLLEGE; OBJECTIVELY EVALUATE ALTERNATIVES; COULD TAKE ACTION IN THIS SUBJECT AT DA, JCS OR MACV LEVEL.	MAKE SIGNIFICANT CONTRIBUTION (THROUGH RESEARCH, DATA) TO GROUP'S DISCUSSION; GIVE 30 MINUTE BRIEFING; COULD WORK ACTION AT CORPS OR LOWER LEVEL.	READ OR LISTEN SMOOTHLY, 1-2 BACKGROUND INCLUDES BASIC TERMS, CONCEPTS AND RELATIONSHIPS.	READ OR LISTEN, BUT WITH FREQUENT PAUSES TO RECALL MEANINGS AND RELATIONSHIPS.
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9
10	10	10	10	10
11	11	11	11	11
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88	88	88	88	88
89	89	89	89	89
90	90	90	90	90
91	91	91	91	91
92	92	92	92	92
93	93	93	93	93
94	94	94	94	94
95	95	95	95	95
96	96	96	96	96
97	97	97	97	97
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99	99	99	99	99
100	100	100	100	100
101	101	101	101	101
102	102	102	102	102
103	103	103	103	103
104	104	104	104	104
105	105	105	105	105
106	106	106	106	106
107	107	107	107	107
108	108	108	108	108

- VIII SUSTAINING THE FORCE INCLUDES:
74. LIGHT INFANTRY LOGISTICS.
 75. HEAVY FORCE LOGISTICS.
 76. INFANTRY MATERIEL MANAGEMENT.
 77. TANK/AUTOMOTIVE MATERIEL MANAGEMENT.
 78. MISSILE MATERIEL MANAGEMENT.
 79. AVIATION LOGISTICS.
 80. SPECIAL OPERATIONS LOGISTICS.
 81. GRAVES REGISTRATION.
 82. PETROLEUM MANAGEMENT.
 83. SUBSISTENCE MANAGEMENT.
 84. AERIAL DELIVERY & MATERIEL.
 85. SUPPLY & MATERIEL MANAGEMENT.
 86. TRAFFIC MANAGEMENT.
 87. MARINE & TECHNICAL OPERATIONS.
 88. HIGHWAY/RAIL TRANSPORTATION.
 89. CHEMICAL BARRIERS & MATERIEL MANAGEMENT.
 90. THE ARMY MAINTENANCE SYSTEM.
 91. MEDICAL SERVICES.
 92. TREATMENT LOGISTICS.
 93. CONCOM OPERATIONS.
 94. DEPOT OPERATIONS.
 95. LOGISTICS OVER THE SHORE.

- IX LEADERSHIP INCLUDES:
100. ALCOHOL AND DRUG ABUSE.
 101. BATTLEFIELD LEADERSHIP.
 102. COMMAND INFORMATION.
 103. LEADERSHIP TECHNIQUES.
 104. PROBLEMS OF TEAMWORK.
 105. PROFESSIONALISM AND ETHICS.
 106. RACE RELATIONS.
 - 107.
 - 108.

A-C-3

TAB C

**REAR OR LISTEN, NOT
WITH FREQUENT PAGES
TO SPECIAL MEASURING
AND RELATIONSHIPS.**

FAMILIARITY
READ OR LISTEN SMOOTHLY.
1.8. BACKGROUND INCLUDES
BASIC TERMS, CONCEPTS
AND RELATIONSHIPS.

KNOWLEDGE
WASL SIMPLIFY CONTRADICTION
(THEORY, RESEARCH, DATA) TO
GROUP DISCUSSION; GIVE 30
MINUTE BRIEFING; COULD WORK
ACTION AT CORPS OR LOWER
LEVEL.

UNREMARKED
WRITE ESSAY ON YOUNG PAPER;
GIVE 1 HOUR CLASS AT THE
HIGH COLLEGE; OBJECTIVELY
EVALUATE ALTERNATIVES; COULD
TAKEN ACTION IN THIS SUBJECT
AT 04. ICE ON MACHIN LEVEL..

APPLICATION
LEAD A STUDY PROJECT;
LEAD A TASKFORCE;
PROVIDE COUNSEL OR ADVICE
A SENIOR LEADER (3 OR 4
STAR) POSITION IN THIS
BRANCH

11.7. JOINT AND COMBINED OPERATIONS : INCLUDES :

39 AIRSPACE CONTROL
40 COMBINED COMMS. OPERATIONS
41 PERFORMANCE EVALUATIONS
42 PERFORMANCE EVALUATIONS
43 AIRCRAFT OPERATIONS
44 JOINT AIR SUPPORT PLANNING
45 RESEARCH STAFF PLANNING
46
47 WORLD WIDE MILITARY COMMAND AND CONTROL SYSTEM.

IV. SECURITY ASSISTANCE INCLUDES:

- 49. INDEPENDENT OPERATIONS.
- 50. INTERNAL DEFENSE AND DEVELOPMENT.
- 51. MASS/MOBILIZATION OPERATIONS.
- 52. MILITARY ASSISTANCE.
- 53. SECURITY AND DEFENSE TRAINING PROGRAMS.
- 54. TERRORISM.
- 55. UNCONVENTIONAL WARFARE.

55. UNCONVENTIONAL WEAPONS.

VI. FOREIGN AREA (WRITE IN COUNTRY OR AREA)

Please write in your mail

TAB C

THE LIVING EXPERT SYSTEM

APPENDIX B

LEXSYS TRAINING PACKAGE FOR PROTOLEX

A. INTRODUCTION. The purpose of these instructions is to enable you to access the computer teleconference and comfortably get around to the extent you can participate. It is possible that you may decide to participate in a number of other nets which can be accessed through this system. Should that be the case, you will probably need to expand on your knowledge of the Army's teleconferencing programs. Your sponsor can assist you if that is your intent.

For this study, there are three general system interface possibilities: the Texas Instrument Silent 700, the Army War College WYSE system (available in your seminar room), and privately owned PC systems with modem interface. The choice of which system you use will be largely yours; however, the following factors may be considered:

1. **Silent 700.** This system is much simpler to operate than the AWC WYSE computer system; however, there are only seven of these systems available. In addition to the simplicity of operation, the system is convenient; it is hand portable, and can be used at home (if you have a telephone with a standard handset).

2. **AWC WYSE system.** While the current system is admittedly more complicated to use than the Silent 700, it does have certain advantages. After you are on line with the system, it is considerably faster than the Silent 700; and you can write, record, and edit your transactions directly into your word processor file. If you are reasonably well versed with the WYSE system and word processing, this may be your best choice.

3. If you own a PC system and have a modem to access a local telephone number, you are all set. Individual instructions on access will be provided to you. These instructions should enable you to master the necessary commands to participate in the conference.

B. GENERAL INSTRUCTIONS.

1. The computer system that you use will be connected to the Army's host computer at Wayne State University through a local telephone number (249-9311). The host computer services over 1500 participants world-wide on the Army ENTRYNET. The main purpose of ENTRY is to serve as a gateway to a number of other subnets which serve a number of more specific users. For our effort, the PROTOLEX subnet has been established to support the study.

2. The instructions will begin by outlining Silent 700 access, log on, and registration procedures (Tab A). Next, instructions on using the AWC WYSE system will be provided (Tab B). An finally, instructions will be tailored to your needs if you elect to use your privately owned system. The final section will describe some of the more common commands which will be required to operate effectively in PROTOLEX (Tab C).

In most cases, the instructions will highlight the required actions or inputs of the operator in **bold print**. Additionally, some of the actions/inputs are followed by the instruction to press return; however, that is not consistent throughout the instructions. You must remember that after all keyed inputs, you must press return to transmit the command through the computer terminal.

LEXSYS TRAINING PACKAGE FOR PROTOLEX

TAB A

SILENT 700 PROCEDURES

(Note: Operator inputs to the computer terminal are highlighted in **bold print**.)

- o Starting out.
 - oo Familiarize yourself with the system (description provided) and check paper quantity.
 - oo Place the system near a power outlet which is convenient to a telephone (standard hand set should be used).
 - oo Plug the system in and turn on.
- o Logging on the Silent 700.
 - oo Dial the local telephone access number; from Carlisle, 249-9311. (If you are outside of the local dialing area, see Colonel Tom Norton.) Listen for the carrier tone, and place the handset in the cradle (ear piece to the right).
 - oo After the green on line light illuminates (approximately 10 seconds), **press return twice**.
 - oo Following TELENET and a series of numbers, the **TERMINAL=** prompt will appear; you **enter D1** and return.
 - oo A @ prompt will now appear; **enter 313202** and return.
 - oo At the Which Host prompt, you **enter WU** and return (Wayne University).
 - oo The Michigan Terminal System (MTS) banner will appear, followed by other information. After the pound (#) prompt, you **enter SIG**, followed by your **personal access code** and return. (For example, SIG xlgv).
 - oo You will be asked to enter your password. You **enter the word PEACE** and return. (Note: the password will not print out as you input it.)

B-A-1

Tab A (Instructions - Silent 700)

o Conference Registration

- oo After welcoming you to Army ENTRY, you will be led through a one-time registration.

(Note: For our purposes, it is not necessary to include all of the information requested; however, **include your name, phone number, and that you are on the PROTOLEX study team.** The CTRL H command may be helpful to correct "typos;" it functions as a backspace/erase key (one space at a time).

- oo You will be asked to enter your first name, last name, and phone number; simply follow the instructions.
- oo It will ask you OK TO USE MF FOR YOUR MESSAGE FILE? **Respond YES.**
- oo You will be asked to confirm the information. **Type either yes or no** after it asks IS THIS INFORMATION CORRECT?
- oo You will now be asked WOULD YOU LIKE TO SEE A PARTICIPANT LIST? **Enter NO**, since there are approximately 1700 people in the system. (Note: if you entered YES before reading this, don't panic. A handy command to remember is the **Ctrl E** command. It is used to abort a command or text. You will find it useful any time the computer is giving you data you are not interested in.)
- oo You are now asked to PLEASE ENTER A BRIEF INTRODUCTION. A **couple of lines** is all that is necessary; however, that is your call. When you are done, **press return twice**. You may have used the Ctrl H command here to correct the text already. Do not be concerned over your intro at this point; if you are a perfectionist, you will have the opportunity to correct it later, should you desire.
- oo After having pressed return twice, you will be asked to EDIT, VIEW, CANCEL, MORE, OR DONE. Once again, your choice, with the exception of EDIT command. This command is not user friendly, and has resulted in many aborted sessions. (No big deal, you will just have to start over again.)
- oo When you are reasonably satisfied with your INTRO, **type done** and return. You are now a member of the Army ENTRYNET. Note: At this point, you will have a new message awaiting you on ENTRYNET. In order to read it, **type in M NEW**. After the message is displayed, you will be offered the choice of replying to the message, deleting, or ignoring it. Recommend you delete by **entering D**.

B-A-2

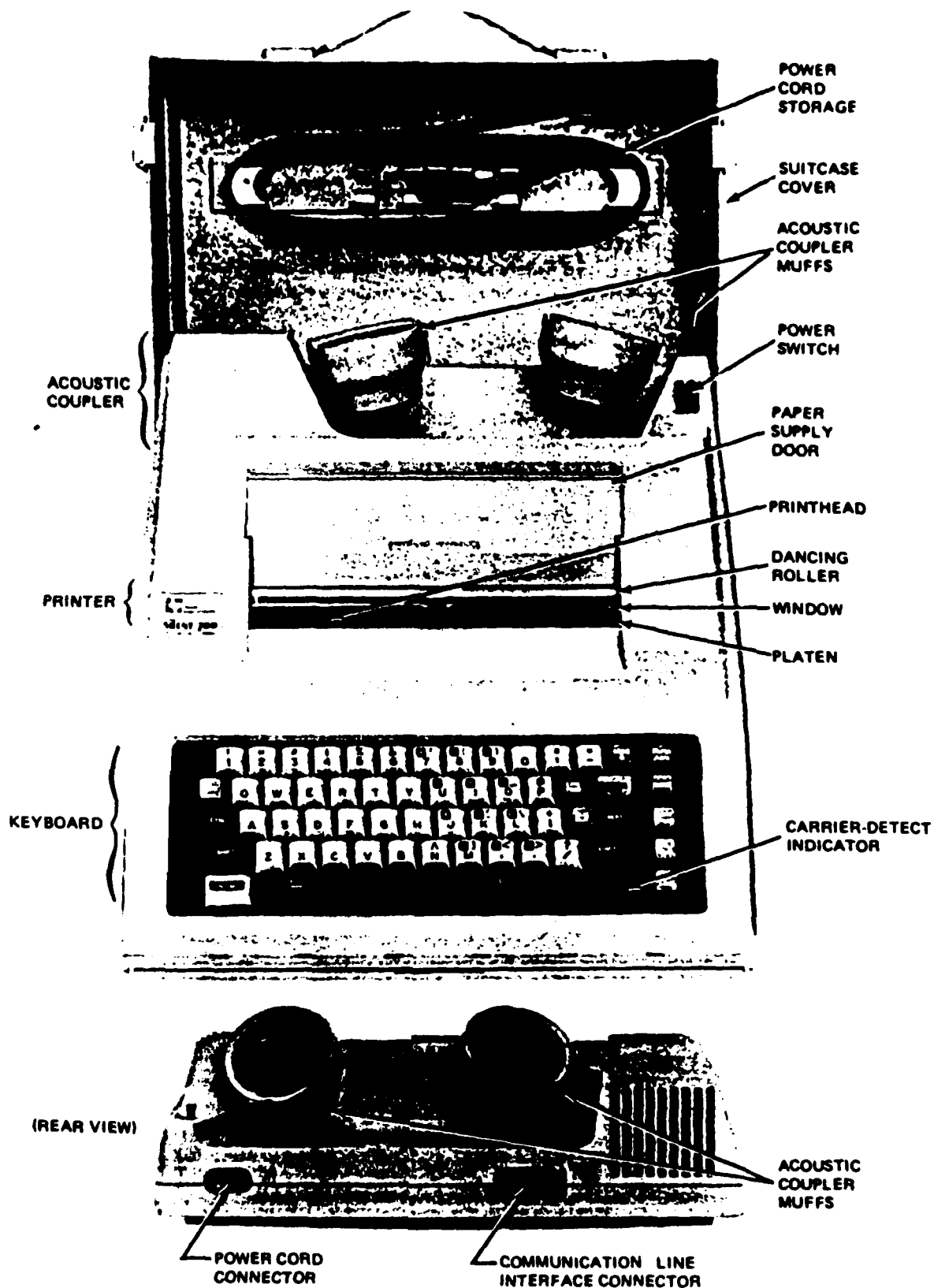
Tab A (Instructions - Silent 700)

o Joining PROTOLEX

- oo After your conference registration session, you will get a DO NEXT? prompt. **Enter J ARMY:PROTOLEX.**
- oo You will again be led through a short registration procedure. The first prompt asks that you identify your status on the net: participant, observer, etc. After the ENTER P, O, A, C, etc., you **enter P** (for participant).
- oo The registration session is identical to the session on ENTRYNET; you will be asked to **enter your name.**
- oo You will now be asked WOULD YOU LIKE TO SEE A PARTICIPANT LIST? Probably a good idea at this point; **enter Y.**
- oo After the participant review is completed, you will be asked to PLEASE ENTER A BRIEF INTRODUCTION.
- oo When you are done with the intro, you will be given a listing of new items, responses, and messages, followed by a DO NEXT? prompt.
- oo You have the choice of reviewing a specific item, by **entering I <number>** (for example I 10), or all new items by **typing I NEW.**
- oo After each item is displayed, along with all responses to date, you will be asked to RESPOND, FORGET, or PASS. For your first session, **respond PASS.**
- oo After the session, you will have a "hard copy" of the items, responses, and messages. Recommend you review them "off line," organize your thoughts/inputs, and input them during your next session. (To do that, you simply request the specific item you want to respond to; for example, item 8 by imputing I 8.) You will have recalled that item, along with all responses, and be again given the option to RESPOND, FORGET, or PASS.
- oo You will also have a message awaiting you in PROTOLEX; you can recover it by either a M NEW or M <number> command.

- o Signing Off the Conference
 - oo When you have completed the session, **enter quit**. You will be shown a dollar balance remaining. If you are concerned about running low on funds, give your sponsor a call; he can arrange for additional funding.
 - oo **Hang up your telephone receiver, turn the terminal off, and cover.**
 - oo By all means, **JOIN US AGAIN SOON -- AND FREQUENTLY!**

Your study sponsor is _____.



Model 745 Portable Electronics Data Terminal

B-A-5

Tab A (Instructions - Silent 700)

LEXSYS TRAINING PACKAGE FOR PROTOLEX

TAB B

AWC WYSE COMPUTER OPERATIONS

- o General. You will be accessing the PROTOLEX computer teleconference through the AWC WYSE systems. Recall, you have a full word processing capability with this system (procedure is described below). Operator inputs are highlighted in **bold print**.
- o Accessing the system.
 - oo Log onto the AWC system, as you normally do. When the menu appears, **enter 1**.
 - oo A \$ prompt will appear next. You enter **vt minnie**. This will move you into another computer system which has a modem capability. You must also **log on this system**; the procedure is nearly identical to the one used for the standard system; the only difference is that after you log on, a TERM = (50) prompt will be displayed. You must **press <return>** before the main menu appears.
 - oo After the menu is displayed, **input 1** and return; a \$ prompt will appear.
 - oo Enter the following: **cu -1/dev/ttyc6 dir: tee <date>**. Note: the fourth character is the letter l (lima), the first number may be either a 6 or 7 (different lines), the keystroke after dir is the upper case key immediately to the right of the space bar (not a colon), and the date must not have any space between the day and month. For example, **cu -1/dev/ttyc7 dir:tee 29feb**.
 - oo The date entry is now your index to the word processing record of your session. That is, after your session, you can enter the word processing function and recall the session. You can (and probably will) edit the session before printing. Give the EDIT OLD DOCUMENT command, and enter the date as the document name. If you are going to have more than one session on any one day, use sequential dates; for example, 29 feb, 29feb1, 29feb2, etc.

B-B-1

Tab B (Instructions - AWC WYSE)

- oo The next prompt will be the word **CONNECTED**. You enter **CTRL B** and return.
 - oo The system indicates that it is ready, and an asterisk will now appear, you input the letter **d**.
 - oo It will now ask for the **NUMBER?** Enter **9k2499311**.
 - oo You will then receive the following: **DIALING, ANSWER TONE, LINE, NO ERROR CONTROL**. Be patient, this may take up to a minute. Press return twice.
- o Logging on the system (AWC WYSE Operations).
- oo Following **TELENET** and a series of numbers, the **TERMINAL =** prompt will appear; you enter **D1** and return.
 - oo A **@** prompt will now appear; enter **313202** and return.
 - oo At the **Which Host** prompt, you enter **WU** and return (Wayne University).
 - oo The Michigan Terminal System (MTS) banner will appear, followed by other information. After the pound (**#**) prompt, you enter **SIG**, followed by your **personal access code** and return. (For example, **SIG xlgv**).
 - oo You will be asked to enter your password. You enter the word **PEACE** and return. (Note: the password will not print out as you input it. Additionally, the system will attempt to lead you through a password change; for this effort, you may retain use of the word **PEACE** for access.)
- o Conference Registration.
- oo After welcoming you to **Army ENTRY**, you will be led through a one-time registration.
- (Note: For our purposes, it is not necessary to include all of the information requested; however, include your name, phone number, and that you are on the **PROTOLEX** study team. The **CTRL H** command may be helpful to correct "typos;" it functions as a backspace/erase key (one space at a time).
- oo You will be asked to enter your first name, last name, and phone number. Follow the instructions. Remember, the **Ctrl H** command to backspace for corrections.

- oo It will ask you OK TO USE MF FOR YOUR MESSAGE FILE?
Respond YES.
 - oo You will be asked to confirm the information. **Type either yes or no** after it asks IS THIS INFORMATION CORRECT?
 - oo You will now be asked WOULD YOU LIKE TO SEE A PARTICIPANT LIST? **Enter NO**, since there are approximately 1700 people in the system. (Note: if you entered YES before reading this, don't panic. A handy command to remember is the **Ctrl E** command. It is used to abort a command or text. You will find it useful any time the computer is giving you data you are not interested in.)
 - oo You are now asked to PLEASE ENTER A BRIEF INTRODUCTION. A **couple of lines** is all that is necessary; however, that is your call. When you are done, **press return twice**. You may have used the Ctrl H command here to correct the text already. Do not be concerned over your intro at this point; if you are a perfectionist, you will have the opportunity to correct it later, should you desire.
 - oo After having pressed return twice, you will be asked to EDIT, VIEW, CANCEL, MORE, OR DONE. Once again, your choice, with the exception of EDIT command. This command is not user friendly, and has resulted in many aborted sessions. (No big deal, you will just have to start over again.)
 - oo When you are reasonably satisfied with your INTRO, **type done** and return. You are now a member of the Army ENTRYNET. Note: At this point, you will have a new message awaiting you on ENTRYNET. In order to read it, **type in M NEW**. After the message is displayed, you will be offered the choice of replying to the message, deleting, or ignoring it. Recommend you delete by **entering D**.
- o Joining PROTOLEX
- oo After your conference registration session, you will get a DO NEXT? prompt. **Enter J ARMY:PROTOLEX**.
 - oo You will again be led through a short registration procedure. The first prompt asks that you identify your status on the net: participant, observer, etc. After the ENTER P, O, A, C, etc., you **enter P** (for participant).

B-B-3

Tab B (Instructions - AWC WYSE)

- oo The registration session is identical to the session on ENTRYNET; you will be asked to **enter your name**.
 - oo You will now be asked WOULD YOU LIKE TO SEE A PARTICIPANT LIST? Probably a good idea at this point; **enter Y**.
 - oo After the participant review is completed, you will be asked to PLEASE ENTER A BRIEF INTRODUCTION.
 - oo When you are done with the intro, you will be given a listing of new items, responses, and messages, followed by a DO NEXT? prompt.
 - oo You have the choice of reviewing a specific item, by **entering I <number>** (for example I 10), or all new items by **typing I NEW**.
 - oo After each item is displayed, along with all responses to date, you will be asked to RESPOND, FORGET, or PASS. For your first session, **respond PASS**.
 - oo After the session, you will have a "hard copy" of the items, responses, and messages. Recommend you review them "off line," organize your thoughts/inputs, and input them during your next session. (To do that, you simply request the specific item you want to respond to; for example, item 8 by imputing I 8.) You will have recalled that item, along with all responses, and be again given the option to RESPOND, FORGET, or PASS.
 - oo You will also have a message awaiting you in PROTOLEX; you can recover it by either a M NEW or M <number> command.
- o Signing Off the Conference
- oo When you are completed with the session, **type in the word QUIT**. This will take you out of the WU computer.
 - oo You may now disconnect from the line by **entering** (upper case symbol over the return key; also type in the period.)
 - oo The system will display the word DISCONNECTED. You now **press the Ctrl D keys** simultaneously.

- oo The main menu will appear at this point. You now have the choice of signing off of the system by pressing the delete key (as you would in the normal word processing mode) or you may want to review/print the session as previously described.
- oo By all means, **JOIN US AGAIN SOON -- AND FREQUENTLY!**

Your study sponsor is _____.

LEXSYS TRAINING PACKAGE FOR PROTOLEX

TAB C

COMMON COMMANDS

The following list provides you with some of the more commonly used commands:

IF YOU WANT TO:

Read new messages
Read new items
Read new responses
Transmit new messages
Enter new public item
Pause current text
Resume text after pause
Abort current text
Log off & leave network
See titles of new items
Read new items
Read new items without prompt
to RESPOND, FORGET, PASS?
Read new responses
Read a particular item
Enter a new item
Enter a new response

ENTER THIS:

M NEW
I NEW
R NEW
T
E
Control-S
Control-Q
Control-E
QUIT
D NEW
I NEW
I NEW PASS

R NEW
I (number)
E
R (item #)

A MENU FOR CONDUCTING SEARCHES:

Find which items contain a
specified string of
characters
EXAMPLE:

Find which items contain both
"XX" & "YY"

FIND "XXXXX"

FIND "leadership"

FIND "XX&YY"

IF YOU WANT TO CHANGE NAME, SSN, INTRO:

To change any of the above

CHANGE (NAME)

THE LIVING EXPERT SYSTEM

APPENDIX C

PROTOTYPE OPERATIONS ANALYSIS (PROTOLEX)

A. GENERAL. A prototype test was conducted 14 March to 2 April, 1988. The purpose of the prototype was to determine the feasibility of LEXSYS by identifying procedural difficulties and to determine whether or not LEXSYS could be successfully utilized by the Army's senior leaders to help solve issues of concern.

A basic requirement for the conduct of the prototype was the need to identify experts from within the staff, faculty, and student body of the Army War College. A survey form, designed to identify individuals with various levels of expertise in a broad group of significant categories was provided to the population of the college. Of the 332 individuals surveyed, 167 responded. For the purpose of this study, those responding at the 1 through 3 Level of knowledge were classified as experts.

The issue selected for resolution was "The Status of the National Training Center Upon Mobilization." This is one of several issues considered "hot" by the Chief of Staff, U.S. Army. The DCSOPS Training Director agreed to support the project as a test.

A total of 19 experts from three functional categories participated in the prototype. The first group was comprised

of seven experts identified from the Army War College. DCSOPS provided five individuals from FORSCOM, TRADOC, ODCSOPS, the NTC, and the JRTC to work the issue as positional experts. The third group of experts was obtained through a bulletin entered on the Army FORUM net (a computer telecommunications network) asking for volunteers. A total of three individuals responded and were entered on to the LEXSYS net.

Since this was a test of the concept, the decision was made for the ODCSOPS participant and a member of the Army War College LEXSYS study group to jointly act as the Issue Facilitator. This reduced the training requirement for the ODCSOPS participant and permitted close evaluation and management of the prototype test.

A training package was prepared to aid all experts in becoming familiar with the procedures for computer teleconferencing and for establishing the telecommunications link. This package was designed to stand alone, but in practice, the coach/pupil method was also used.

The operational length of the prototype test was established as two weeks; however, the test exceeded this period by three days. The time was extended to summarize the data collected and to offer the participants a final opportunity to comment.

Among the interesting observations resulting from the prototype were:

1. The conditions for the test were not considered optimum in that the time frame for the test competed with the

requirement to complete the Military Study Projects, a major Army War College academic requirement. This precluded several student volunteers from participating in the project and curtailed the responses of others participating.

2. Conflicting duties of the positional experts identified by DCSOPS detracted from their ability to participate.

3. Experts who own their own computer system were the most active players.

4. Two members of the AWC faculty were unable to participate directly on the computer, but provided their input on the issue through interviews. The results of the interviews were added to the material gathered through computer teleconferencing.

5. The participants from the FORUM net were highly active in the test. This is more than likely a direct result of two facts: their desire to be involved with the information gathering process, and their familiarity with asynchronous computer teleconferencing.

The observations identified above are considered to be representative of actual operations of a full LEXSYS network of the future. While these factors may have affected the volume of comments on the net, the proceedings of the prototype provided ample response useful in formulating a position paper to the DCSOPS and subsequently to the Chief of Staff of the Army on the mission of the NTC upon mobilization.

The operation of the prototype has demonstrated that LEXSYS is capable of meeting senior leader needs to study and

help resolve Army issues prior to the conduct of the staffing process.

It is important to note that these results warrant further research to develop the concept into an operational reality. After additional review and refinement, a series of prototypes should be undertaken in various disciplines to determine the feasibility of bringing the LEXSYS concept into a full up system available to the Army's senior leadership.

B. PROTOTYPE OVERVIEW. This section provides a detailed overview of the prototype test. Significant features of the test and their relationship to an operational LEXSYS net are identified. Some problem areas will be highlighted with comments to correct the problem in the operational system. The prototype was conducted on a subnet of the LEXSYS net named PROTOLEX. PROTOLEX discussions are provided in Volume II.

A LEXSYS prototype test was conducted to determine the feasibility of LEXSYS to function as a realistic means to study issues or resolve problems. Planning for the test began in January 1988 with a target window of March. The test ran from 15 March to 2 April 1988.

In actuality, the concept was being tested for five months on the LEXSYS subnet prior to the prototype (PROTOLEX subnet). A study group of AWC students and a score of people from the Army FORUM net joined the LEXSYS net for a careful analysis of LEXSYS and its potential for helping to solve

issues and problems for the Army's senior leadership. A list of the participants is provided at Tab A.

The discussions on the LEXSYS subnet of the Army FORUM net represented an issue study environment. The members were attempting to define the concept through discussion over a computer teleconferencing system. The key difference in the LEXSYS net and the PROTOLEX subnet established for the test was that the prototype used selected experts to work a specific problem for the DCSOPS. Most LEXSYS participants from the AWC were not experts in teleconferencing nor in computer operation. The AWC students were working the concept as part of the academic requirements of the school.

The objective of the prototype was to conduct as realistic a test as possible using a problem statement directly from the Army senior leadership. However, upon review of the CSA "Hot Issue List," it was realized that most of the issues provided were broad in scope and involved political, economic, or social considerations which went beyond the initial LEXSYS talent pool.

The AWC LEXSYS team identified "training" as the discipline for study as this was the discipline in which the highest number of AWC students and faculty members indicated expertise on the survey.

Locating a proponent for the study proved to be a difficult task. Several ODCSOPS Directors who were approached to sponsor the study issue declined due to their current work load. A

shortage of personnel, suspense actions, and project responsibilities were listed as reasons for noninvolvement. In addition, the Army budget was under review and had been returned to the staff for rescrub several times.

The Director of Training, ODCSOPS, agreed to act as proponent on the issue of determining the mission of the National Training Center (NTC) during mobilization. A staff officer was designated to work the issue jointly with the AWC team as the Issue Facilitator (IF).

The staff officer provided background papers on the NTC and war time considerations. An IF from the AWC team was selected to work jointly with ODCSOPS IF. Through a series of telephone conversations and review of the background papers, the issue was prepared for presentation on the PROTOLEX subnet. The AWC IF prepared the issue statement while the ODCSOPS IF completed training in computer teleconferencing protocols.

As the issue was being prepared, the AWC experts were being contacted and asked to participate in the test. Of the 30 experts with either training or mobilization indicated as areas of expertise, 10 agreed to participate.

A training package designed to assist in the procedures for computer subnet entry, along with the basic commands of the CONFER teleconferencing software, was provided to the participants. This was a self tutor package explaining procedures for three possible computer systems available to the war

college students. A copy of the training materials was provided at Appendix B.

To assist in the training and to monitor the training process, each AWC expert was assigned a sponsor from the LEXSYS team. The functions of the sponsor were to help the expert with initial entry procedures and to respond to requests for assistance at any phase of the prototype. A coach-pupil approach was used in several cases to augment the training package.

Entry into Army FORUM for the prototype participants required completion of a personal introduction process. The process is time consuming since the introduction is required for each subnet on FORUM the participant joins. Each expert was required to join three networks: the Army FORUM net, the LEXSYS subnet, and the PROTOLEX subnet. As a result, the process lasted between 45 and 75 minutes, depending upon the typing ability of the expert.

The time involved to enter the subnet detracted from overall participation. None of the new experts interacted on the net at first entry. Some of the enthusiasm for the test was lost at this point. The participants had been told that their participation would last no longer than 30 minutes a day.

The entry procedures for the prototype were unique to the test and would not be replicated in an operational LEXSYS net. An operational net will have one entry point directly to the issue subnet.

As the experts received initial training and entry was accomplished, they were encouraged to review the background data on the net and to raise questions for clarification prior to the start of subnet discussion. Actual discussion was slow in starting. Some of the experts were not knowledgeable of the NTC organization or mission. These individuals were reluctant to participate. Although they considered themselves experts in training, the narrow scope of the issue caused them to feel unqualified to comment.

The ODCSOPS IF identified five individuals from various commands to participate in the discussion. These individuals were considered "position" experts. Their normal duty requirements included actions pertaining to the NTC. These experts represented TRADOC, FORSCOM, NTC, and JRTC. Each of these individuals were trained at their command using participants of the Army FORUM net as coaches.

Because the position experts were familiar with the subnet issue, they were assigned responsibility for preparing the organization portion of the discussion. Overall, the position experts were more active in the discussion than the war college experts.

Part of the testing procedure included a call for experts on the FORUM network. An administrative bulletin was broadcast to all FORUM users requesting individuals knowledgeable in the NTC and training requirements to contact the LEXSYS net organizer for entry into the discussion. Three individuals responded to

the bulletin and were added to the subnet. These individuals did not require training as they were already familiar with the CONFER software system.

As a general comment, the participants did not fully comprehend the time limit of the prototype test. The test period was established as two weeks and actually ran three days longer. Some of the experts wanted to interact after the test was concluded. These individuals believed that there was still time to comment. The ODCSOPS IF was under the same impression, and had hoped to formulate his staffing paper with the help of the experts on the net.

The volume of traffic on the issue -- the relationship between "responses" to "items" -- was lower than expected. Three possible factors contribute to the low volume of activity: the confusion over the length of the test, the lack of familiarity of the experts with the issue, and the difficulty of overcoming the inadequacy of using the computer.

The volume of activity does not indicate that the test was unsuccessful. The "responses" to the issue provided several new ideas or approaches to the problem. The ODCSOPS IF was pleased with the information received and requested to continue his efforts on the subnet to finalize his position paper.

During the test, the most distracting factor affecting the discussion was the break in communication with the ODCSOPS IF and the NTC position expert. They represented the information pool on the issue. Both of these individuals were required to

attend meetings in a TDY status for a period of several days. Thus, questions raised on the subnet were not answered in a timely manner, awaiting their return to the net. The problem could have been overcome by using a desk top computer at the TDY location.

C. ISSUE FACILITATOR CONSIDERATIONS. The key to success in any meeting is the conferencing skills of the moderator. His tasks include developing the agenda, selecting the participants, leading the discussion, and refocusing the forum to reach the objective of the meeting. Additionally, the moderator should be technically knowledgeable of the subject matter.

The Issue Facilitator (IF) is the LEXSYS conference moderator. The requirements for this individual are exactly the same as stated above except that the IF must possess a basic understanding of computer teleconferencing.

The IF maintains the energy of the subnet. As a minimum requirement, the IF should enter the subnet daily to assess progress, respond to questions, challenge participants, maintain discipline, and update the issue proponent. In subnets with a high volume of "responses," the IF may have to enter the subnet two or three times a day to be responsive to the participants.

The IF responsibilities should rest with one individual. During the prototype test, the IF responsibilities were shared between an action officer from ODCSOPS who managed the issue and a LEXSYS team member who managed the teleconferencing

aspects of the subnet. This division of responsibilities was necessary to insure control of subnet operations.

The following is a list of specific functions of the IF:

1. The IF must organize the conference prior to the opening of the subnet. The organization must consider the selection of experts, preparation of an agenda, assignment of briefing responsibilities, responsibilities for training experts, and identification of the subnet objective.

2. The IF should provide issue background information to the participants prior to the start of the subnet conference. This information can be loaded on to the subnet a few days prior to start of operations and during the train up time of the experts.

3. The IF must respond to questions raised by the experts immediately. Any hesitation detracts from conferencing operations and hinders further "responses." Some questions may require the IF to assign another expert to answer the question.

4. The IF must be available to the subnet at least once per day regardless of duty responsibilities. If the IF must depart on TDY or leave, he must have computer access to the subnet. Since LEXSYS is asynchronous, access to the subnet should include weekends and holidays.

Below is a summary of some of the significant IF problems encountered during the prototype test:

1. Since the IF responsibilities were split, some confusion existed on division of responsibilities. This confusion

resulted in delays in responding to questions on the subnet and briefing assignment.

2. The ODCSOPS IF was unable to enter the subnet at least once daily due to other responsibilities, TDY, and leave. This absence from the subnet for periods of up to four days left the experts without direction.

D. EXPERT SELECTION. The survey instrument for selecting the experts to participate in PROTOLEX was developed by the LEXSYS team members and staffed with the war college data analysis branch before being distributed to the AWC students. A marked sensed form was used for survey response for ease of data analysis. Respondents were permitted to write in additional areas of expertise within a given subject area. A list of the additional subject areas of expertise is provided at Tab B, Appendix A.

The survey instrument was distributed to the AWC student body on Monday with a return date on the following Friday. Of the total 332 survey instruments distributed, 167, or 50%, were returned completed.

When the questionnaires were returned, the marked sense responses were given to the data analysis branch for analysis. The survey forms were transcribed by the LEXSYS team members. Write in responses were tallied separately. A total of 112 write in responses were received, identifying 91 specific areas of expertise. A copy of the expert survey results is provided at Tab C, Appendix A.

The decision to use the three upper categories of responses to signify expertise was an objective decision of the LEXSYS team. The criteria could be refined to the upper two categories if the level of interaction on the prototype test indicated that individuals who responded with a "3" were not knowledgeable of the subject matter.

A degree of anonymity was entered into the data analysis through the use of war college mail box numbers instead of the names of the respondents. This precluded LEXSYS team members from judgmental actions while transcribing the responses and selecting experts for participation in the prototype.

E. ISSUE/PROBLEM DEFINITION.

1. **General.** The preparation of the "Issue Statement" is the responsibility of the Issue Facilitator (IF). This process is not difficult, but requires planning and organization of the material to insure that the issue is presented in a comprehensive manner. The IF must consider the degree of knowledge of the participating experts on the subject matter as the issue is prepared for discussion. Experts with general knowledge of a given subject area may require detailed explanation of the specific discussion topic.

Preparation of the issue statements is not very different from establishing a meeting. The same procedural considerations apply to a LEXSYS subnet as apply to a round table meeting. An agenda is established, responsibilities are assigned for the presentation of specific sections of the agenda, and rules

of order apply. Individual LEXSYS experts can be assigned responsibility for preparation of information on the subnet. This requirement must be assigned in advance of subnet operations to insure the material can be presented in a timely manner.

The FORUM teleconferencing software establishes conference rules of order. The "item" is a partition in FORUM for organizing the agenda issue topics for discussion. The "item" allows for the presentation of an idea and follow on discussion of the topic through a "response." The "item" and their follow on "responses" permit each participant to review the full discussion on a topic, as desired. During normal day-to-day participation on the LEXSYS subnet, the participant would see only those "items" and "responses" entered onto the subnet since the last time the expert entered the subnet.

Successful participation or issue resolution is based upon proper structuring of the issue and the frequency of responses by the participants. Generally stated, the more frequent the responses, the more valid and comprehensive the information. However, a low response activity does not indicate that an incomplete discussion of the topic was accomplished. The IF must determine whether the experts are actively engaged in the discussion and, on occasion, may have to prompt experts to provide their comments.

The IF determines the point at which discussion on the issues should end, when a summary "item" of the discussion should be prepared to refocus the direction of discussion, and

the point at which the net ceases to be productive. Once expert "responses" cease to add new ideas, the subnet should be closed.

2. Prototype Issue/Problem Definition. Organization of the issue/problem statement was accomplished in three groups of "items." The first group consisted of one "item" which provided basic information or instructions for all participants.

The second group consisted of three "items" and can be best described as the background or historical information pertaining to the issue. The first "item" in the group included the problem statement and background information. Any known considerations impacting on any decision or recommendation of the subnet was explained. The IF was responsible for preparation of the "item."

The second "item" in group two listed the known alternatives for resolving the issue in question and requested the participants to identify, by "response," any other possible alternatives. The IF prepared the "item."

The third "item" in group two provided descriptive information on the table of organization of the NTC. The IF tasked two participants to provide appropriate information. Since the participants were considered the most qualified to present the data, the level of detail was left to their discretion.

Group three consisted of one "item" for each course of action presented as a solution to the issue. Initially, six

courses of action were listed in group two, but one of the expert's "responses" suggested an additional alternative. This suggestion was added as an "item." The IF was responsible for preparation of the "items" and for determining whether to add an "item" based on an expert's response.

Group three provided the logical format for the discussion of the issue. Since each alternative was listed independently, "responses" to these "items" provided a clean delineation of ideas without overlap between alternatives. If the alternatives had been listed as a group, the discussion may have caused confusion as to which alternative the "response" was directed.

F. PROPONENT COMMENTS. At the conclusion of the prototype, the issue proponent was asked to comment on the following points.

1. The value of the prototype in providing new ideas vice rehashing previous thoughts.
2. The amount of involvement versus return for effort.
3. The potential value for the proponent in using LEXSYS again to solve other issues.
4. Any suggestion the proponent may have to improve LEXSYS.
5. Any plans the proponent may have to use the data collected during the prototype.

The proponents indicated that LEXSYS is a viable decision support system and that it did provide new ideas or thoughts on the issue. The combination of experts in both the training and mobilization discipline gave two different perspectives to develop a position paper.

Learning the procedures for teleconferencing and CONFER software was not that difficult; however, managing the teleconferencing network required significantly more effort.

LEXSYS could serve several purposes within the DCSOPS; however, participation requires a commitment of time. Normal duties and responsibilities sometimes impact on the amount of time that is available to facilitate a teleconferencing network. LEXSYS afforded the proponent the opportunity to complete a project that would not have normally been completed as quickly.

The product could be improved by working the issue over a longer period of time. He believed that the PROTOLEX net was closed down too quickly based on the complexity of the issue.

The proponent requested that the net remain open to allow positional experts and volunteer AWC participants to develop a final staffing action on the issue.

G. EXPERT PARTICIPANT COMMENTS. Upon conclusion of the prototype test, each AWC participant was asked to comment on the LEXSYS concept. Their comments on participation and the merits of the LEXSYS concept are summarized below:

1. All of the AWC experts felt the test was informative. Many agreed that participation was rewarding and that they would participate in future LEXSYS nets if available.

2. Reluctance of the AWC experts to interact on the system was generally attributed to competing requirements for available time and a lack of skill in using the computer.

3. Local phone link connections contributed to the disruption of telecommunications on several occasions.

4. While each AWC participant considered himself an expert in either training or mobilization, not all experts were familiar with the operations of the National Training Center. Thus, there was a hesitancy to participate fully in the discussion.

5. Many of the difficulties encountered by the experts during the prototype test may have been overcome if the test had been conducted over a longer period of time.

H. CONCLUSIONS. In any examination of the results of a prototype test, it is important to remember that any single prototype can only demonstrate feasibility. The purpose of the LEXSYS prototype was to demonstrate that the concept would work; that is, a computer teleconferencing system using a pool of experts can resolve an issue without a formal meeting. To this degree, the prototype proved the concept was feasible.

The results from the LEXSYS prototype suggest that the concept is both practical and manageable, albeit there are several areas within the concept which require further study and testing. The requirement for further study is not to continue to prove or disprove LEXSYS as a senior decision maker's analysis tool, but rather to refine the concept to its most efficient capability.

In this light, some of the most interesting study results are summarized:

1. The issues of concern for the Army's most senior leaders are broad in scope and involve political, economical, international, or social perspectives beyond the scope of the small talent bank of experts in the current LEXSYS data base. If LEXSYS is to continue to evolve, significant attention must be given to building a larger talent bank.

2. Several issues were suitable for the prototype; however, finding a proponent to sponsor the test was difficult. The most common reason for nonsupport was that other duties precluded devoting time to the project. Each individual approached for proponency stated that their staff was small and that suspense actions or project completion dates were of utmost importance. A significant factor during this period was that the Army budget submission had been returned for scrub and rescrub, which increased ARSTAFF workload.

3. Only 10 of the 30 experts at the AWC agreed to participate. This breakout is considered representative of a fully operational LEXSYS. The full-time duties and personal responsibilities of perspective experts will dictate the perceived amount of time available to work on a LEXSYS subnet.

4. Subnet participation analysis disclosed that one third of the experts made more than three "responses" in discussion. Two points of interest are appropriate. First, the volume of "responses" is not a criteria for successful issue resolution or an indication of subnet success. Second,

this level of activity is not considered unusual for a teleconferencing system or a round table meeting.

5. Problems in communications links between local phone lines and the communications node at Carlisle Barracks disrupted participation of at least two experts.

6. The requirement for learning computer skills is a problem for some participants. An expert getting involved for the first time on a computer teleconferencing net must become computer literate, and must learn the control commands of the CONFER teleconferencing software.

7. The prototype issue of developing the National Training Center mission upon mobilization required expertise in the disciplines of both training and mobilization. Prototype experts were selected from both disciplines.

8. Disruption of continuity of discussion on the subnet resulted from regularly assigned duties, TDY, leave, and, for the AWC experts, academic requirements. While some disruption can be expected during normal LEXSYS subnet operations, the fact that the military studies project was due at the same time as the prototype test directly affected the participation of AWC students.

9. The prototype revealed that individuals comfortable with the computer teleconferencing process had a tendency to dominate the conference, exclusive of their expertise with regard to the issue being discussed.

I. **RECOMMENDATIONS.** The major effort required now is to follow up on some of the observations and conclusions observed in the prototype. This should be accomplished in three directions:

1. Establish proponency for LEXSYS on the Army Staff.
2. Work jointly with the War Colleges to expand the expert data base.
3. Conduct a series of prototype tests to determine which variables best represent an effective problem-solving technique.

The prototype has shown that an issue can be resolved in a short period of time at a minimal cost and time expended. Establishing proponency on the Army Staff will facilitate the identification of issues for resolution and will further test and enhance the capabilities of LEXSYS.

Expansion of the data base will improve the capabilities of LEXSYS to handle a diverse array of issues/problems for resolution. Incorporating the student body from each war college not only broadens the talent bank, but it expands an awareness of LEXSYS among senior leaders.

Efforts must be made through testing to determine which variables provide the optimum LEXSYS subnet. Future tests should consider handling issues from various disciplines, varying the number of participating experts, changing the length of the test periods, altering the responsibilities of the issue facilitator, and altering the training procedures for new participants.

PROTOTYPE OPERATIONS ANALYSIS (PROTOLEX)

TAB A

PROTOLEX PARTICIPANTS

FACULTY, U.S. ARMY WAR COLLEGE

Colonel Edmund J. Glabus (USA, Infantry)
Chairman, Department of Command, Leadership and Management

Colonel Robert A. Holden (USA, Field Artillery)
Director, Force Structure and Mobilization Management

Colonel John C. Speedy, III (USA, Armor)
Director, Command and Leadership Studies

Colonel Leonard Hardy (USA, Field Artillery)
Director, Force Integration Studies

STUDENTS, U.S. ARMY WAR COLLEGE

Lieutenant Colonel Vollney B. Corn, Jr. (USA, Field Artillery)

Lieutenant Colonel Joseph T. Cox (USA, Signal Corps)

Lieutenant Colonel William J. Densberger (USA, Armor)

Lieutenant Colonel Pierce T. Graney (USA, Infantry)

Lieutenant Colonel Thomas A. Green (USA, Aviation)

Lieutenant Colonel Ramon A. Ivey (USA, Aviation)

Lieutenant Colonel Robert S. Lay (USA, Aviation)

Colonel Thomas H. Norton (USA, Chaplain)

Lieutenant Colonel Richard A. Pomager, Jr. (USA, Military
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Lieutenant Colonel Randall L. Rigby, Jr. (USA, Field
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OTHER PARTICIPANTS

Lieutenant Colonel John Miller (USA, Field Artillery)
Chief of TRAC, Monterey, California

Major Kurt Norman (USA, Armor)
Action Officer, Training Directorate, Deputy Chief of
Staff for Operations, Department of the Army

Major Nick Psaki (USA, Infantry)
NTC Desk Officer, Active Component Training Division,
Deputy Chief of Staff for Operations, FORSCOM

Lieutenant Colonel Robert Scott (USA, Armor)
Installation G-3, The National Training Center and
Fort Irwin, California

Lieutenant Colonel Rick Walker (USA, Aviation)
Student, Industrial College of the Armed Forces, Fort
McNair, Washington, D.C.

THE LIVING EXPERT SYSTEM

APPENDIX D

ARMY WAR COLLEGE STUDY GROUP MEMBERS

Faculty Advisor: T. C. Tatum
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LTC, QM
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THE LIVING EXPERT SYSTEM

APPENDIX E

LEXSYS SUBNET PARTICIPANTS

All members of the AWC Study Group listed in Appendix D, plus:

Major Bruce Boevers (USA, Infantry)

Assigned to the Army Studies Group, Office of the Chief of Staff, Army. Current major areas of responsibility include low intensity conflict, special operations, and the DoD reorganization. Western European Specialist (Foreign Area Officer). Expertise and experience in light and heavy Infantry operations with an emphasis on operations in urban areas.

Lieutenant Colonel James Cary (USAR, Aviation)

Assigned to the U.S. Army FORUM Office. Responsible for the educational applications of teleconferencing. Special interests in computer operations and teleconferencing.

Lieutenant Colonel Edmund Feige (USA, Infantry)

Director of the U.S. Army FORUM. Responsible for the functioning and effectiveness of the Army's computer-based teleconferencing effort, currently with over 1200 participants. Assigned to the Office of the Chief of Staff, Army. Expertise and experience in light and heavy Infantry operations and organizational effectiveness.

Captain Mike Kanner (USA, Armor)

Currently serving at the U.S. Army Infantry School. Interests and expertise in training, motorized operations, directed energy weapons, armor operations, terrorism counteraction, night operations, battlefield management, and command and control. Is the chairman of the working group to produce the decision briefing for the LES concept.

Captain John Lesko (USA, Armor)

Currently assigned to the U.S. Army Materials Technology Laboratory, Watertown, MA, working as an R&D officer specifically looking at advanced materials application to the next generation of combat and tactical vehicles. Major project: a composite/hybrid fighting vehicle. Force Modernization Force Development experience with Div86 transition. Commanded cavalry platoons and company. Currently working on advanced degree.

Colonel (Ret) Mike Malone (USA, Infantry)

Author; combat leader; teacher of leadership, interpersonal and organizational communications; mentor and teacher of countless young (and not so young) officers. The driving force behind the development of the LES concept. "His text is concerned military professionalism. The product lives on in his students, tomorrow's leadership. Over a full career, he has given life and meaning to the terms 'conscience of the Army' and 'Spirit of the Soldier,' for both are accurate descriptions of Mike Malone--the man, the soldier."--GEN E.C. Meyer, Chief of Staff. Currently conference organizer for Army:BnCdr.

Captain Chuck Powell (USA, Armor)

Currently pursuing an Army-funded advanced degree program at the University of Washington. Extensive experience in development of the light infantry division (motorized). Interests and expertise in the areas of military leadership, organizational values, and decision making.

Colonel (Chaplain) Timothy Tatum (USA, Chaplain Corps)

Currently serving as Director of Ethical Development Programs, U.S. Army War College, Carlisle Barracks. Also represents the Department of Command, Leadership and Management, in matters dealing with automated instruction, ADP, software engineering, and teleconferencing. Undergraduate degrees in electronics and English Bible, Masters Degrees in Theology, Divinity, Guidance and Counseling, and Education. Some experience in SSB, FM and RITY communication in the HF and VHF bands.

Lieutenant Colonel Chris Wise (USA, Infantry)

Currently serving as Pakistan and Afghanistan Desk Officer and Civil Affairs Officer with the U.S. Central Command. Active in the field of computer-based teleconferencing for five years. Formerly conference organizer for Army:ForceMod, addressing Force Mod and Force Integration issues in the early 1980's. While serving at USACAC, developed and fielded the Army's New Organization Training Team (NOTT) to train senior leaders in the field on the implications and tactics of the Division86 structure.

Major Alex Wojcicki (USA, Chemical Corps)

Conference Organizer for Army:LES, and suborganizer of Army:SpecOps. Active in the field of computer-based teleconferencing for five years. Formerly conference organizer for Army:ForceMod, addressing Force Mod and Force Integration issues in the early 1980's. A leader in the effort to develop one of the Special Operations functional areas.